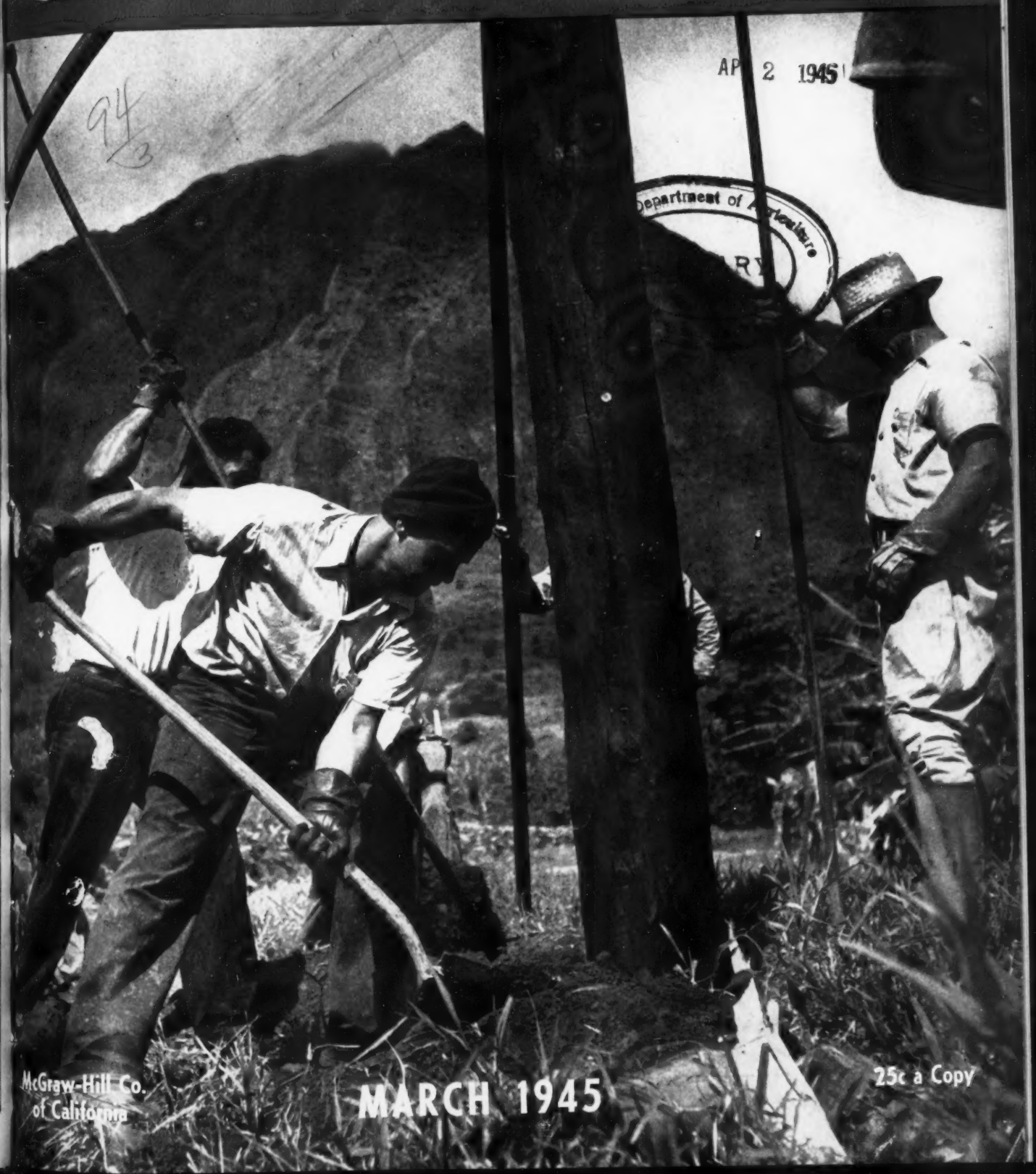
ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.



McGraw-Hill Co. of California

MARCH 1945

25c a Copy

TIME TO CHECK OVER YOUR Electric Pump
"GET IT READY FOR THE PUMPING SEASON"
CHECK YOUR ELECTRIC PUMP NOW!
"MAKE SURE IT'S READY FOR THE PUMPING SEASON"
"GET READY NOW FOR THE BROODING SEASON!"
CLEAN–OIL–REPAIR your electrical poultry equipment
Are your electric brooders and other electrical poultry equipment in good shape for the coming season? It is a good idea to check over all your equipment now—you may have less time to do so later.
CLEAN ALL EQUIPMENT

SERVICE TODAY... SALES TOMORROW

Edison service to its farm customers (nine out of ten farms in Edison territory are electrified) goes beyond providing low cost electricity. The advertisements shown here, part of a series currently appearing in leading agricultural publications of this area, are also designed to serve. They tell readers how to take proper care of electric pumps and poultry equipment, and offer useful booklets on the care and use of farm electrical equipment.

Long, dependable service from present electrical equipment will be remembered by its owners when new equipment again is available. Thus, this advertising also benefits electrical appliance and farm equipment dealers. The farms of Central and Southern California will be one of the West's greatest markets for tomorrow's electrical products.

SOUTHERN CALIFORNIA Edison

Southern California Edison Company Ltd.

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), March, 1945. Vol. 94, No. 3. Published monthly by the McGraw-Hill Company of California, 68 Post Street, San Francisco, 4, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rate in U. S. and U. S. possessions, Canada and Pan-America, $2 per year; all other countries, $3 gold. Single copy 25c.
Copyright, 1945, McGraw-Hill Company of California.

AGAIN AVAILABLE
PREWAR QUALITY

Novalux FORM 79

WITH THESE EXPENSE-SAVING FEATURES

1 Cast-aluminum hood—light, strong, non-rusting

2 Sockets and receptacles securely mounted —assure correct focus throughout life

3 Heavy-duty, long-life sockets and receptacles—large terminals for easy wiring

4 Weather, dirt, and insects excluded without depending on gasket

5 Attractive, natural aluminum finish—no painting required

6 Suspension chain for reflector—frees both hands

7 Alzak* finished aluminum reflector—highly efficient, lightweight, durable

8 Steps protect lamp stem from heat concentration

9 Spring toggle latches make servicing easy

10 Spun-sealed assembly keeps interior clean, reduces glassware breakage cost to less than 10 cents average per luminaire per year

11 Long-life Holophane refractor or clear-glass globe, pressed for uniform thickness, rippled for proper diffusion and sparkle

Simple exchange plan provides low-cost, fully reconditioned reflector assembly for replacing broken glassware

*Manufactured under Aluminum Company of America Patents.

Units of the Form 79 family are available with hoods, insulators, and reflectors to meet any local condition of mounting or desired light distribution. G-E specialists in street lighting and the G-E Illuminating Laboratory will help you apply them to best advantage, or help you plan a comprehensive modernization project for the future. *General Electric Company, Schenectady 5, N. Y.*

Are you tieing in with the NEMA Plan to give America better street lighting? Remember . . . . GOOD STREET LIGHTING BUILDS GOOD WILL.

Buy all the BONDS you can—*and keep all you buy*

GENERAL ELECTRIC

452-27-3010

ELECTRICAL WEST

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Cover photo: Hawaiian Electric Co. crews set a pole during line construction.

CHANGE OF ADDRESS

Circulation Manager,
Electrical West,
68 Post St.,
San Francisco 4, Calif.

Please change my address

From .....

To .....

Signed .....

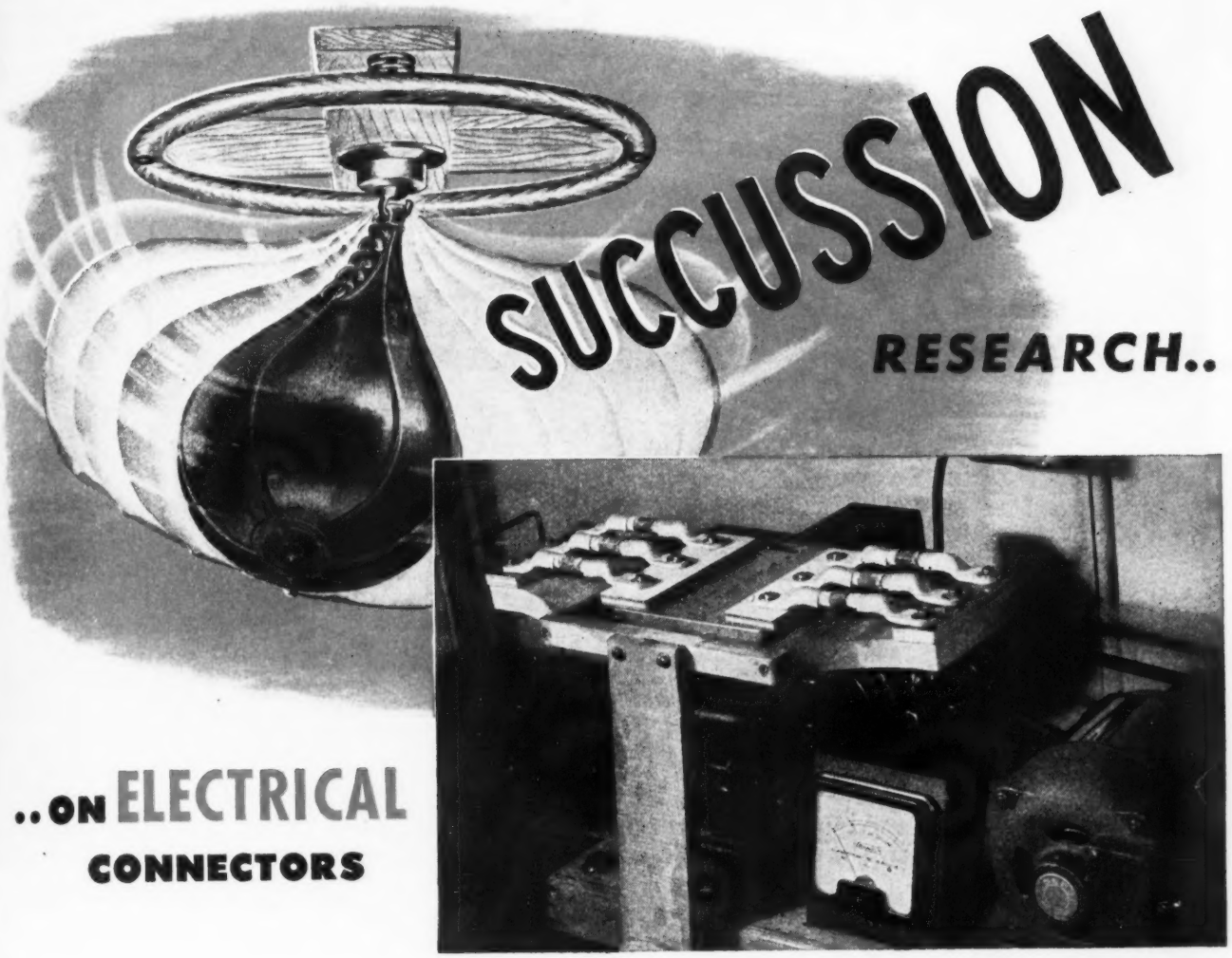
People

F. T. Letchfield, who wrote the leading article in this issue ("Outlook for the Engineer"—page 55) is especially well qualified to discuss this subject. He was graduated from the University of Wisconsin in electrical engineering in 1912 and he holds equivalent degrees in mechanical and civil engineering. Following field work on construction projects in various parts of the U. S., he was placed in charge of the Virginia power division for the Department of Explosives Plants during the World War. Later he spent some years in the Orient on reconnaissance of industrial and business opportunities. In 1923 he joined the San Francisco Chamber of Commerce as manager of the industrial department, and while there he established a method for dealing with industrial and business problems on an engineering basis. Three years later he became associated with the Wells Fargo Bank & Union Trust Co. as consulting engineer, the position he now holds. In 1937 he toured Europe, inspecting 46 research laboratories in 18 different industries in England, France and Belgium. During this war he served in Washington as assistant to the chairman of the National Defense Research Committee Chief of Engineering Panel. At present he is a consultant to the Office of Scientific Research and Development. He has a clear picture of what is ahead for the engineer based upon an intimate knowledge of the newest scientific developments. Furthermore, he is an able and accomplished writer.

Preview

Next month ELECTRICAL WEST publishes its annual Manufacturers' Directory. For those people in the Far West who specify, buy, use or maintain electrical equipment, apparatus or supplies, this is a most useful tool. It lists where such materials may be obtained in the West—whether from branch offices or plants of manufacturers, or from representatives and agents in the various Western cities.

Of course there will also be a full issue of articles and news too.



SUCCUSSION RESEARCH.. ..ON ELECTRICAL CONNECTORS

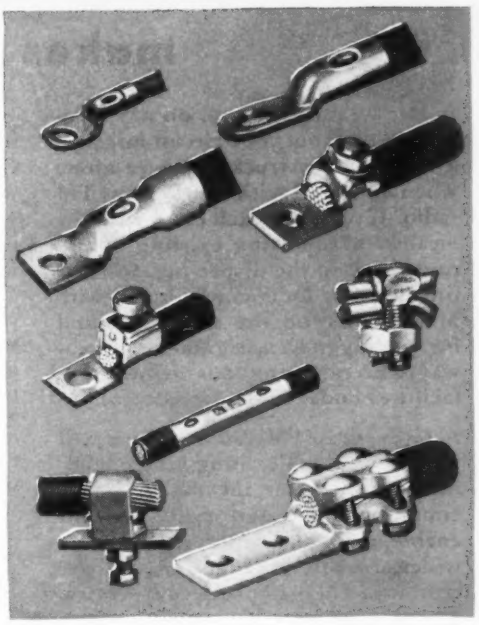
Succussion* in some form . . . from mild vibration to heavy shock . . . is present around every electrical connector in service. If succussion wins, circuit efficiency drops or service stops . . . and costly maintenance begins.

How, then, can you be sure the connections you make, in your product or in your plant, will remain unaffected by mechanical abuse? You'll find the answer here in Burndy's torture chamber where connectors are 'pre-tested' through a rigorous physical 'workout'.

Hour after hour, they are vibrated at varying frequencies and amplitude. But in addition, very unusual methods are employed to add shock, stress and twist as well. After which their electrical resistance and strength are carefully measured to make sure there has been no change . . . that they are worthy of the Burndy name.

These 'physicals' are but part of the thorough test procedure here in the Burndy laboratories . . . all aimed to assure that your circuits or equipment suffer no connection troubles in service. If you don't have the Burndy catalog, let us send you a copy. Burndy Engineering Co., Inc., 107V Bruckner Boulevard, New York 54, N. Y.

*Succussion: *forcible shaking, violent shock.*



Headquarters for CONNECTORS

Burndy

In Canada: Canadian Line Materials, Limited, Toronto 13

G-E 2-WAY FM RADIO

makes utility maintenance more effective

In fair weather or foul, on any location throughout your circuit mileage, a maintenance truck is never alone when equipped with a G-E 2-way FM radio. It provides each crew with the means for reporting existing conditions back to the dispatcher, for getting help fast, for communicating with other crews on the same job, and for getting new assignments. Two-way radio can bring your maintenance facilities under finger-tip control.

A G-E 2-way FM radio system will give you reliable, long-range communication under the most adverse conditions, day and night. It will enable maintenance crews to serve wider areas in less time and at lower cost. It will help improve your service.

In serving your radio-communication needs, G.E. offers you the same specialized attention that is extended to you in your power-distribution and maintenance requirements. Call your G-E sales engineer when you discuss your communication problems. He will have a specialist assist in planning the most effective system for your installation. *Electronics Department, General Electric, Schenectady 5, N. Y.*

Write for these booklets: "G-E FM Communication System Guide" gives you practical facts about the selection of 2-way FM radio and will assist you in estimating total installation costs. "G-E FM Communication Equipment Catalog" describes and illustrates the required units and accessories.

Hear the G-E Radio programs: *"The World Today" news, Monday through Friday, 6:45 p. m., EWT, CBS. "The G-E All-Girl Orchestra," Sunday 10 p. m., EWT, NBC. "The G-E House Party," Monday through Friday, 4 p. m., EWT, CBS.*

Government regulations now permit new installations of 2-way FM radio for important requirements of utility companies. Let your G-E representative help you prepare your applications.

Everything for 2-way radio communication

GENERAL ELECTRIC

63-DE-6818

Here

IS THE ANSWER TO R.E.A. AND LIGHT TRANSMISSION LINE CLAMPS

Large legible blueprints covering a full line of accepted clamps and fittings — ultimate strength, weight and recommended conductors, together with all other specifications the engineer wants and understands.

Brewer-Titchener Corporation has always worked in close cooperation with the engineer, insulator and cable manufacturer.

We believe you will find the resulting reference book invaluable in your planning. A copy is available upon request. Please mention Brewer-Titchener Corporation Hi-Line reference book.

Through Your Insulator Manufacturer Only

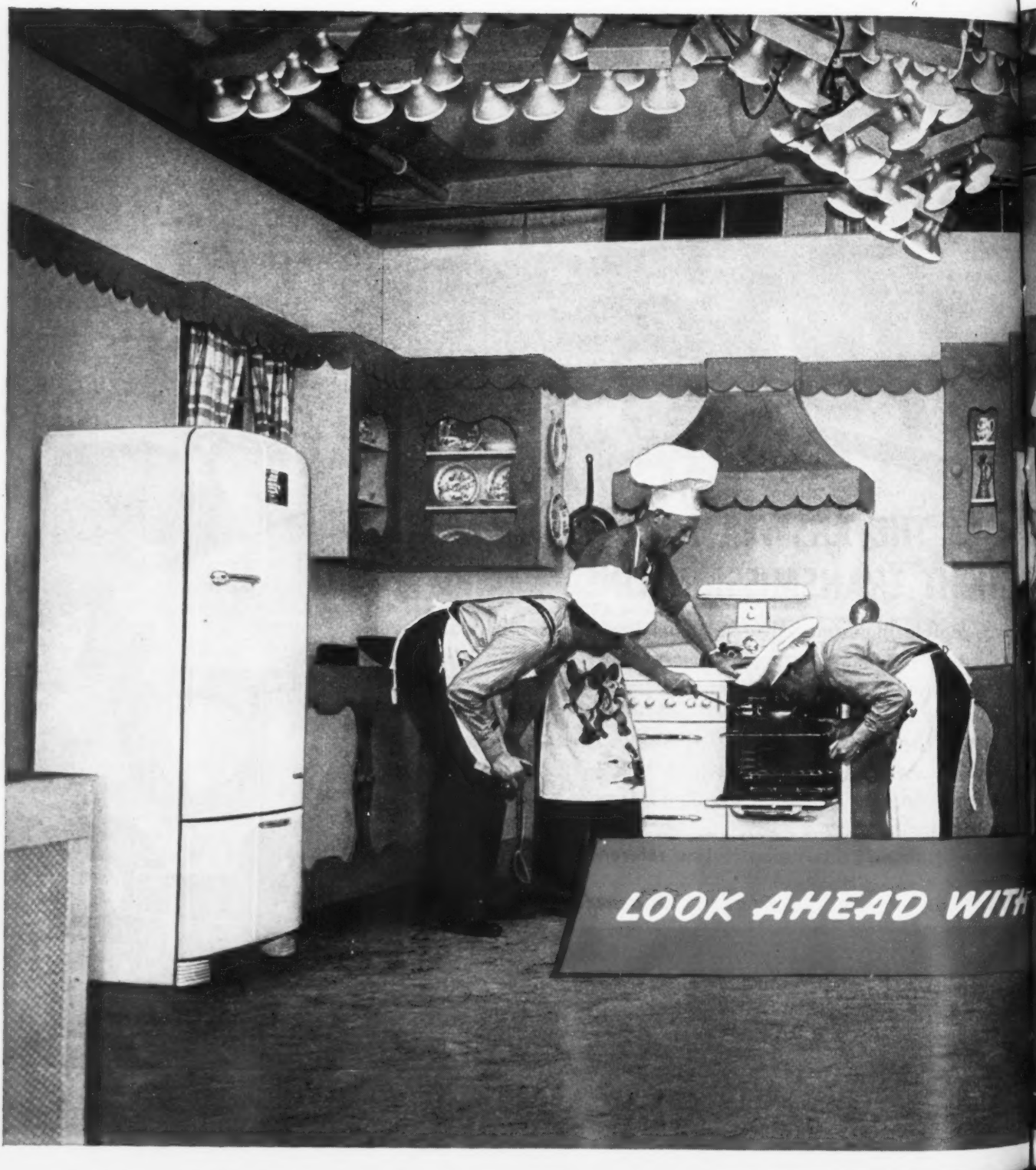
B-T-C

Transmission Line Hardware

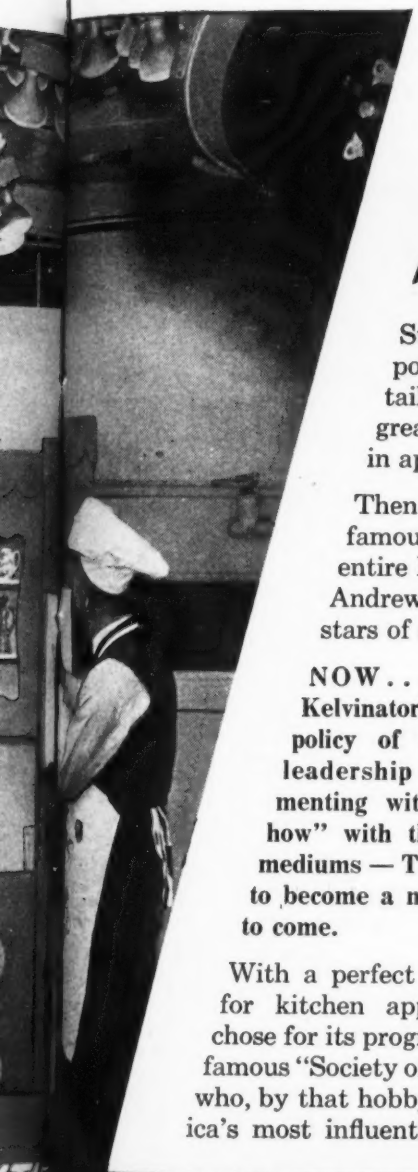
THE BREWER-TITCHENER CORPORATION
CORTLAND, NEW YORK

Another Example of Kelvinator's "Retail-Minded Thinking"

Television



...Advertising!



Experimental Series Starring "The Society of Amateur Chefs" and famous guests to provide "know how" in use of great, new postwar advertising medium.

Starting months ago to pre-sell a vast postwar market for Kelvinator Retailers, Kelvinator launched one of the great national magazine campaigns in appliance-selling history!

Then... Kelvinator added its already famous weekly radio program over the entire Blue Network . . . starring the Andrews Sisters, plus famous guest stars of stage, screen and radio.

NOW... typically in keeping with Kelvinator's dynamic, forward-looking policy of maintaining merchandising leadership . . . Kelvinator is experimenting with and developing "know how" with the newest of advertising mediums — TELEVISION! — destined to become a major factor in the years to come.

With a perfect merchandising tie-in for kitchen appliances, Kelvinator chose for its program experiments the famous "Society of Amateur Chefs"... who, by that hobby, are one of America's most influential groups among discriminating appliance buyers. Illustration at left is action shot from first Kelvinator Telecast which starred Rube Goldberg and Otto Soglow, ace cartoonists, with Ben Butler and John Reed King.

With this unique show, Kelvinator is at this early date gaining knowledge and perfecting techniques in the use of this new sales medium that may well be one of the most powerful of the postwar world.

Merchandising leadership is another reason why, postwar, retailers with the Kelvinator Franchise will hold "the most valuable franchise in the Appliance Industry."

FOR APPLIANCE DISPLAY

Coming soon—a new book of modern store and appliance department layouts to help Kelvinator Retailers plan for greater sales through better display.

Kelvinator

DIVISION OF NASH-KELVINATOR CORPORATION

Kenosha • Milwaukee • DETROIT • Grand Rapids • Lansing

***TUNE IN:** Every Sunday 4:30-5:00 P.M. EWT for the new NASH-KELVINATOR RADIO SHOW, starring the ANDREWS SISTERS — Over the Entire Blue Network.*

CANNON CONNECTORS—*in the most amazing places!*

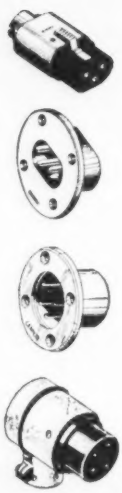
The Rockettes, world-famed precision dancers of Radio City Music Hall.

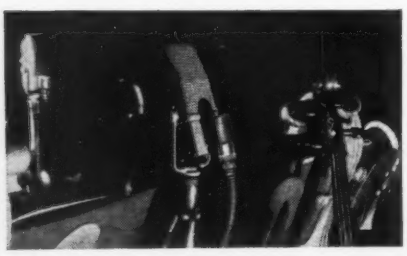
They tap out precision through

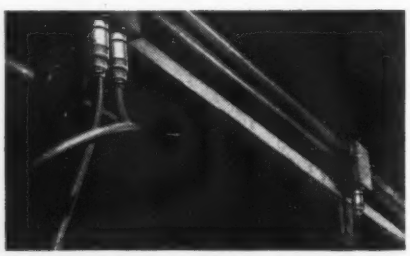
CANNON CONNECTORS

The high fidelity sound system of Radio City Music Hall—the world's largest theater, is connected, throughout, with Cannon Connectors. Cannon Plugs were selected for the job because they could be depended upon. They fit with precision, hold tight and are designed especially for the job expected of them.

You can say that about all Cannon Connectors. The same connector precision demanded in aircraft instruments, in radio and television circuits, in technical laboratory circuits, can be had in the circuits you use. Just specify Cannon Plugs.







Above: Some of the various Cannon Connectors used in the Radio City Music Hall circuits. If you're interested in this type of connector write for P & O Bulletin.

CANNON ELECTRIC

Cannon Electric Development Company, Los Angeles 31, Calif.

Canadian Factory and Engineering Office: Cannon Electric Co., Ltd., Toronto, Canada

REPRESENTATIVES IN PRINCIPAL CITIES—CONSULT YOUR LOCAL TELEPHONE BOOK

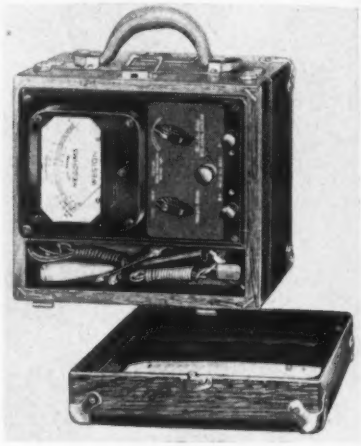
Cannon 3 B-2045

PRODUCTS

that are news

Insulation Tester (300)

Weston Electrical Instrument Corp. has announced Model 796, a direct-reading insulation tester designed to provide complete insulation and resistance tests up to 200 megohms at a test potential of 350 to 500 volts d-c. This instrument can be used also for general resistance measurements from 10,000 ohms to 200 megohms. Although the test potential is 500 volts at the terminals, current is only a few microamperes, making it impossible under normal conditions for



the operator to receive harmful shock, it is stated. The unit operates from self-contained batteries; has no vibrators or tubes to replace. Size is 8x8¾x9 in.; weight 15 lb.

Welder Conversion (301)

Westinghouse reports that it is possible to convert 1,000-amp. a-c welding sets from automatic to manual service should slackening war work decrease the need for the former type. A welder-conversion device will convert one of these machines to serve as a power supply to six individual, manual welding operations, each having a current range of 45 to 270 amp. The device consists of a transformer and a group of six reactors which are fed by the welding transformer. The transformer steps down the normal operating open-circuit voltage from 85 to 75 volts and increases the current capacity of the supply unit. Output of the six groups of reactors is controlled by placing two bayonet plugs in one of 20 possible settings, which provides a current adjustment over the range of 45 to 270 amp. in approximate equal increments of current.

Hay Drier Control (302)

A control for barn hay driers has been developed by General Electric Co. and is available to operate either 3-or 5-hp., 230-volt, 60-cycle, single-phase motors. Similar equipment for motors of larger and smaller ratings will be available later, the company has announced. The equipment consists of a magnetic starter, a time switch and a thermostat, if required. Three on and off predetermined operations are possible in a 24-hour cycle. Both two- and three-pole receptacles are provided, the former for plugging in a remote control lead, or thermostat, the latter for the time switch plug.

Because of the basic importance of adequate wiring to the entire electrical industry, Anaconda is presenting messages like this in a wide list of national publications.

IT'S YOUR POSTWAR ELECTRICAL HOME

—See that it works!

THINK of your electrified home to come . . . big and little appliances of all kinds . . . advanced heating . . . air-conditioning . . . better lighting . . . television . . . All fine servants—but they will be handicapped if you give them insufficient electrical capacity.

So often electrical wiring plans are based on *past* electrical experience—a poor guide to the needs of peak loads to come. It's far safer to plan *reserve* capacity in line with the huge future increase in electrical usage. You'll save yourself plenty of grief later in breakdowns and expensive alterations.

Manufacturers! Apply this in terms of industrial equipment in *your* business. The problem's the same. Make sure you have ample electrical capacity to meet the huge future increases in electrical usage sure to come. In plants too, planned wiring will cost a lot less than unplanned wiring.

Before structures get out of the planning stage, it will pay to consult electrical contractor, utility power engineer, plant power engineer. They'll agree that it's always wiser to *Wire Ahead!* 44265

ANACONDA WIRE & CABLE COMPANY

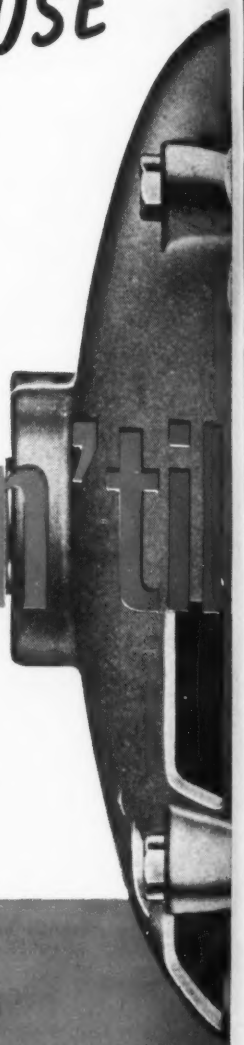
25 Broadway, New York 4 . . . Sales Offices in Principal Cities

It's Always Wiser to TELEGRAM WIRE TELEGRAM AHEAD

ANACONDA

ANOTHER WESTINGHOUSE MOTOR "FIRST"

"No Lubrication" til



PRELUBRICATED BALL BEARINGS PRACTICALLY ELIMINATE BEARING MAINTENANCE...NOW STANDARD ON TYPE CSP MOTORS UP TO 3 HP

Twenty-two years ago Westinghouse was "first" with the "Sealed-Sleeve" Bearing that eliminated oil leakage, kept out dirt, and reduced maintenance on sleeve bearing motors. Today Westinghouse offers the first self-sealed, prelubricated ball bearing that eliminates lubrication for five years. Type CSP prelubricated motors bought now will need no lubrication until 1950.

Prelubricated bearings in Westinghouse motors have been thoroughly field-tested in thousands of Westinghouse lint-free textile motors. Recently a series of bearings was chosen at random and inspected from a group of 600 motors, the first of which were installed between six and seven years ago. All were in perfect condition—even though they had been in operation 24 hours a day and had never been lubricated.

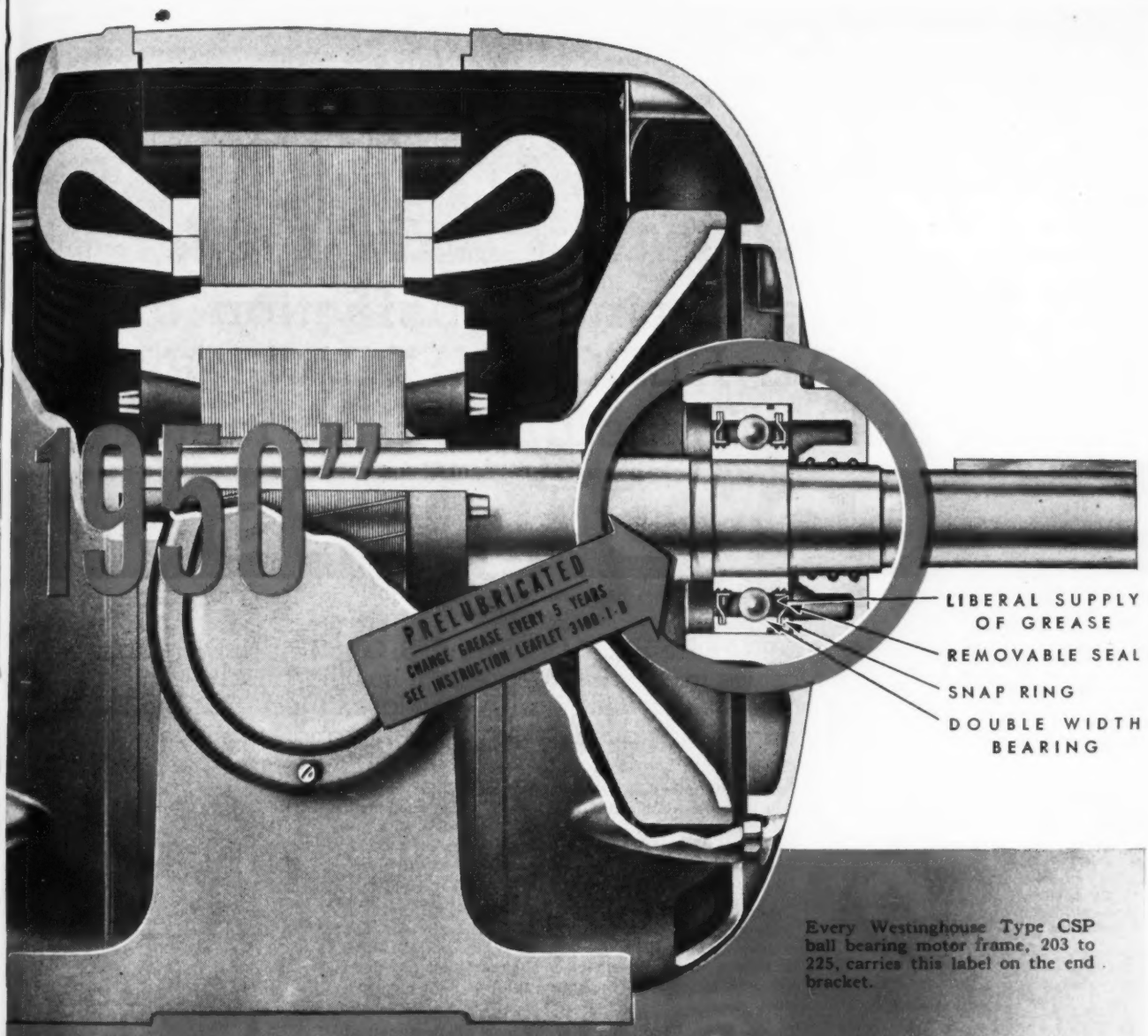
Time-tested special applications such as these have often paved the way for improvements in standard motors. Type CSP motors incorporate the fruits of wide Westinghouse motor application experience. When you buy a Westinghouse Type CSP motor, you get all the latest improvements. For complete information, write for DB 3100-CSP, Westinghouse Electric & Mfg. Co., P.O. Box 868, Pittsburgh 30, Pennsylvania. J-21318

ADVANTAGES

OF WESTINGHOUSE TYPE CSP MOTORS

- PRELUBRICATED SEALED BALL BEARINGS reduce lubrication maintenance . . . assure longer grease life.
- IMPROVED TUFFERNELL INSULATION.
- DYNAMICALLY-BALANCED ROTOR.
- DIE-CAST ROTOR with oversize fan.
- LIBERAL THROUGH-VENTILATION—air enters front, leaves at drive-end of motor.

WESTINGHOUSE



Every Westinghouse Type CSP ball bearing motor frame, 203 to 225, carries this label on the end bracket.

Westinghouse

PRELUBRICATED SEALED BEARING CONSTRUCTION ...retains original grease packing within the stationary seal discs. Bearing chamber accommodates grease sufficient for more than five years of severe service. Held by snap rings, seal discs fit closely over inner race, forming an efficient seal. Snap rings and discs are easily removed to permit packing new grease in bearings.

TYPE CSP MOTORS

Insure enduring satisfaction on your RURAL ELECTRIFICATION jobs by installing sturdy cast metal

CONDULETS

(CONDULETS are made only by CROUSE-HINDS)

There are dozens of Crouse-Hinds CONDULETS, GROUNDULETS and lighting fixtures for use in farm and residential installations. By using this quality material you can put in safe, long-lasting jobs that build good will and bring future business from friends and neighbors.

Type F Service Entrance Cap for Conduit

Type FBM Service Entrance Cap

Type LB Service Entrance Elbow

Type FBA End Fitting

Type FBB End Fitting

Type CGY Service Entrance Connector for Cable

Type GC Strap Clamp

Type GCH Groundulet

Type GC Grounding Strap

Type GC Bushing

Service entrance CONDULETS and accessories for conduit or cable—GROUNDULET safety circuit equipment—OBROUND CONDULETS for general wiring—Switches, plugs and receptacles for indoor or outdoor use—Switch and fuse or circuit breaker CONDULETS for the control of heavy duty circuits.

Safety hand lamps for repair shops and garages—A wide variety of Vaportight lighting fixtures in wall and ceiling types for use as yard lights, in dairies, barns or stables, or in any indoor or outdoor locations where exposed to vapors, moisture, rain or non-explosive dust.

Crouse-Hinds floodlights offer the most efficient method of lighting yards, driveways or any outdoor or indoor location where projected light is desirable. They are economical too! It is often much cheaper to throw the light a considerable distance than to extend wiring and install a local light at that point. You have your choice of a wide beam floodlight or a narrow beam spotlight, with or without a weatherproof glass cover. A spread lens that projects a fan shaped beam is also available. There are Crouse-Hinds floodlights suitable for every lighting requirement.

Type FEE Service Entrance Cap Installation Showing Service Entrance Cable

Type GRF Weatherproof Plug Receptacle Conduit

Type GRF Lamp Receptacle Conduit

Type GRF Weatherproof Snap Switch Conduit

Type C Obround Tumbler Switch Conduit

Type V Vaportight Lighting Fixture with Reflector

Type MDB Floodlight

A Nationwide Distribution Through Electrical Wholesalers

CROUSE-HINDS COMPANY
SYRACUSE 1, N. Y., U.S.A.

Offices: Birmingham Boston Chicago Cincinnati Cleveland Dallas Denver Detroit Houston Indianapolis Kansas City Los Angeles Milwaukee Minneapolis New York Philadelphia Pittsburgh San Francisco Seattle St Louis Washington. *Resident Product Engineers.* Albany Atlanta Charlotte New Orleans
CROUSE-HINDS COMPANY OF CANADA, LTD., *Main Office and Plant* TORONTO, ONT.

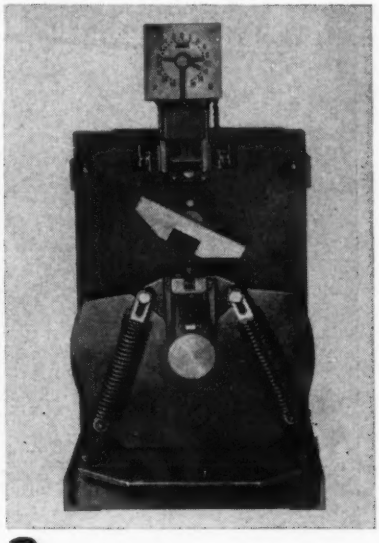
CONDULETS · TRAFFIC SIGNALS · AIRPORT LIGHTING · FLOODLIGHTS

The "Quick-Break" Principle

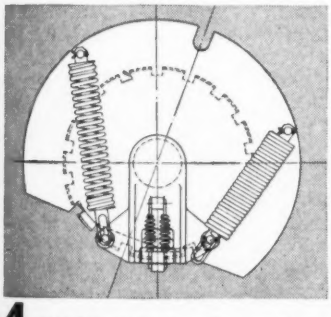
— IT'S TYPICAL OF THE ADVANCED PRINCIPLES USED IN ALLIS-CHALMERS 5/8% STEP REGULATORS

1 SLOW-BREAK action results when energy is applied as it is generated. This is principle of tap-changing mechanisms operated by direct drive.

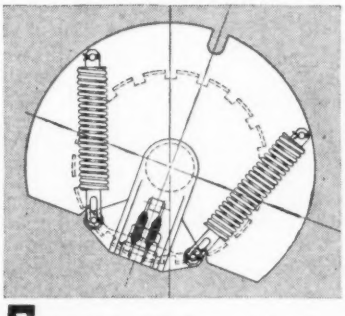
2 QUICK-BREAK principle is building up energy for sudden application. You get this quick-breaking action with Allis-Chalmers tap-changing mechanism.



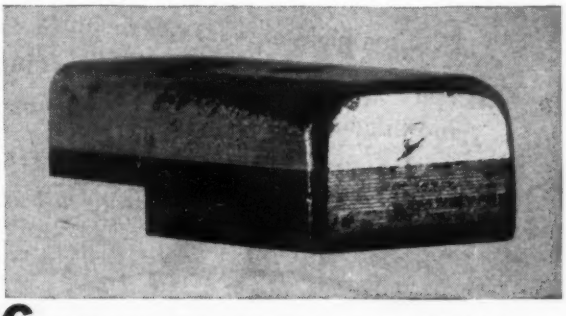
3 MECHANISM is shown above with driving motor and gear removed. Drive springs snub the mechanism to a quick stop.



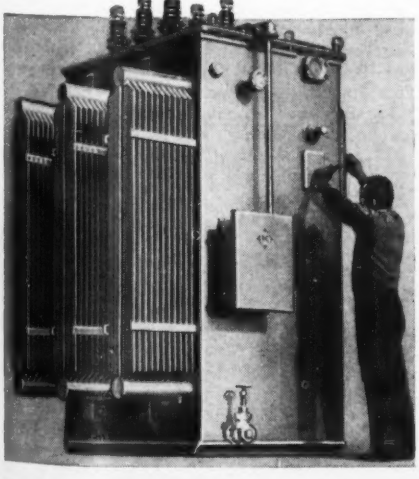
4 COCKED by tension on left-hand driving spring, the mechanism stores energy for a quick change in tap positions.



5 RELEASED by slight forward rotation of moving plate, the crank arm operates tap-changer switch and is snubbed to stop.



6 MOVING CONTACT shows negligible wear after two million operations under normal conditions. Long contact life results from fast separation, sturdy design, and use of non-burning alloy.



7 OTHER PRINCIPLES:

- Allis-Chalmers 5/8% Step Regulators operate on the half-cycling principle, which provides closer regulation . . . results in fewer actual tap changes.
- Feather-touch control, coupled with voltage integration, fits regulator to handle wide range of load conditions.
- Unit construction eliminates 78 bolted connections in the 5/8% Step Regulator.

Write for Bulletin B6056A, ALLIS-CHALMERS MFG. CO., MILWAUKEE 1, WIS.

A 1775

Whatever the Voltage-there are

Allis-Chalmers

5/8% Step Regulators

that will do the job better and at Lower Cost.

Clear across the country... *right through the war!*

PROCTOR maintains service facilities at 81 points, located coast to coast. Despite wartime shortages and difficulties, these service stations are staying on the job right through the war.

MEANWHILE . . . KEEP BUYING WAR BONDS

...and ready for postwar!

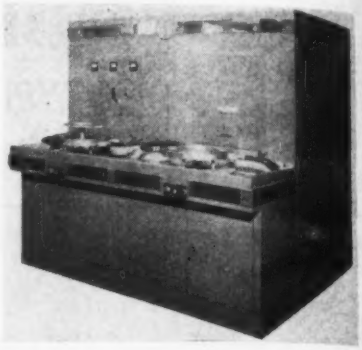
Proctor's nationwide network of service stations will be ready—will be in operation—when the new and finer postwar Proctor appliances hit the market. It's another reason why appliance merchandisers like to do business with Proctor!

PROCTOR

NEWSMAKER IN APPLIANCE MERCHANDISING

PROCTOR ELECTRIC CO.—*DIVISION* OF PROCTOR & SCHWARTZ, INC., PHILA. 40, PA.

Electronic Heater (303)



General Electric now has a 50-kw. electronic heater for surface and localized hardening of gears, rods and other parts and for annealing, brazing and soldering operations. It is in addition to the 5- and 15-kw. heater line and is said to be applicable for many different heating jobs by changing the induction-coil fixture. It is available in models rated either 230 or 460 volts, three phase, 60 cycles; weighs 6,000 lb.; is 84 in. wide, 94 in. deep and 82 in. high. It is completely enclosed in grounded steel to minimize radiation and give protection to the operator. The cabinet has two compartments, one containing an air-cooled transformer to step up power supply voltage to the six rectifier tubes, and accessory items, the other containing the high-frequency components, a single water-cooled oscillator tube and a bank of water-cooled capacitors.

Dust Collector (304)

A unit type dust collector has been announced by Ideal Commutator Dresser Co. for installation on grinders, buffers, sanders, polishers, lathes and other machines. The new unit is said to be compact and to fit beside or behind machines as they stand. A ¾ hp., 3,450-r.p.m. motor, driving a 7½- x 2-in. squirrel cage blower wheel, develops 500 cfm. through two inlets. Dust laden air is drawn through the inlet pipes into twin cyclone separators where it is whirled at high speeds. Dust particles drop into the dust drawer; air then passes through a viscous coated filter, which removes fine dust, before it is discharged back into the room. Dimensions are 20x20x38 in.; shipping weight is 265 lb.

Battery Recharger (305)

A device to permit the recharging of its rechargeable flashlight storage batteries from an automobile battery has been announced by Ideal Commutator Dresser Co. This charger connects directly to the "live" side of the ignition system and may be mounted on the dashboard or the side panel just inside the door. A small pilot lamp indicates when the battery is charging. The Ideal rechargeable flashlight battery, introduced five years ago, fits all popular two-cell, 1¼-in. size D cases.

Air Guns (306)

Trico Fuse Co. has a line of leakproof air guns. There are no levers, buttons, gaskets or glands in the design, it is announced, and the patented ball and socket valve has only two moving parts. Operation is by finger tip pressure. These guns are available in three styles and for complete range of hose diameters. Type "A" is said to be more popular for permanent installations but type "AB" is available for remote control applications.

SELECT G-E FUSES
For Your Wiring Jobs

Protect the wiring systems you install and your customers' electrical equipment with G-E fuses. Use them on maintenance jobs you handle. These are the same fuses General Electric uses to protect its own wiring and equipment. They are made of the finest materials and are thoroughly tested and accurately rated.

G-E Non-renewable Enclosed Fuses 1–600 Amp., 250 V. or 600 V. Both indicating and non-indicating types are available.

G-E Renewable Enclosed Fuses 3–600 Amp., 250 V. or 600 V. Fiber bar supports link, provides proper alignment of terminals, facilitates replacement.

G-E Silvend Fuses with silver-plated contacts 3–600 Amp. 250 V. or 600 V. Designed for use with apparatus having silver-plated fuse contacts. Heating due to oxidation does not occur with this combination.

G-E Pyrex Plug Fuses 3–30 Amp., 125 V. Neat appearing. Have magnifying windows for easy reading.

You'll find G-E fuses of the correct type and proper rating to use on all your jobs. They are all high quality and in keeping with the finest wiring.

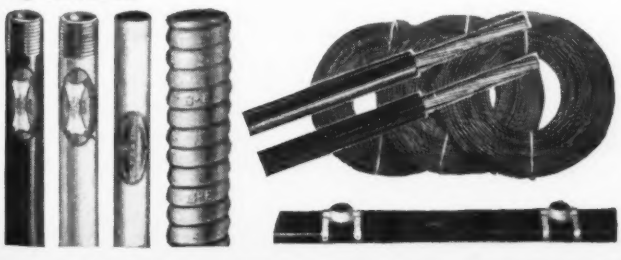
FOR FURTHER INFORMATION on G-E fuses or conduits or building wires see the nearest G-E Merchandise Distributor or write to Section CDW 353-18, Appliance and Merchandise Department, General Electric Company, Bridgeport, Conn.

IMPORTANCE OF ADEQUATE WIRING
Victor W. Hartley, managing director of the Pacific Coast Electrical Association, Los Angeles, Calif., says, "Wiring is a 'hidden value.' Upon its adequacy depends, in a substantial degree, not only the quality of the structure, but its soundness as a long-term investment."
ADEQUATE WIRING
THE KEY TO THE HOME OF TOMORROW
SERVES AND SAVES

G-E CONDUIT AND BUILDING WIRES

There are five different conduits and many building wires in the G-E line including: G-E White and G-E Black rigid conduits, EMT, flexible conduit, Fiberduct and Types SN and SNW small diameter, thermo-plastic insulated Flamenol* Building Wire.

*Reg. U.S. Pat. Off.



Hear the General Electric radio programs: "The G-E All-Girl Orchestra" Sunday 10 P.M. EWT, NBC. "The World Today" news, Mon. through Fri. 6:45 P.M. EWT, CBS. "The G-E House Party" Mon. through Fri. 4:00 P.M. EWT, CBS.

BUY WAR BONDS AND HOLD THEM

GENERAL ELECTRIC

SYLVANIA NEWS
CENTRAL STATION EDITION

MARCH *Published in the Interests of Better Sight and Sound* 1945

Sylvania "Long-Slim" Fluorescent Lamps Open New Possibilities

New Lamps Ideal for Continuous-Row Lighting and Wide Range of Decorative Applications

New, long, slim-diameter fluorescent lamps soon to be produced by Sylvania Electric will open new possibilities in the design of lighting installations.

The new lamps will come in 42" and 64" lengths of only ¾" diameter; in 72" and 96" lengths of 1" diameter. They will be of the instant-starting type, requiring no starter, and will use a single-pin base.

Because of their versatility, these Sylvania LS lamps offer new opportunities for more extensive decorative lighting. For example, they are well-suited for continuous-row installation in factories, schools, stores, and other buildings.

With proper selection of ballasts, they can be operated at either of two current ratings. This feature may encourage the installation of extra fixtures as night lights in stores and restaurants. Operated at the lower current rating for lower brightness, LS lamps may serve as a late-hour window display medium and as an added safety feature.

As yet the new lamps are available only in sample quantities. However, the data below will be helpful in recommendations for postwar installations.

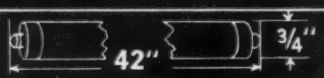
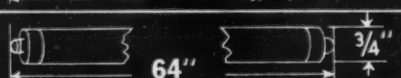
Another addition to Sylvania's Fluorescent line is a 13-watt miniature lamp, of the conventional starting type, 21" long and ⅝" in diameter.

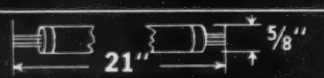
JUDGES AT WORK

Four judges and a Sylvania executive view entries in Sylvania fixture design contest. Foreground (L-R) Lurelle Guild, product design consultant; Allan Parker, Worcester Polytechnic Institute; Howard Sharp, Buffalo, Niagara & Eastern Power Corp. Standing (L-R) C. A. Carpenter of Graham, Anderson, Probst and White; Charles Goddard, Sylvania Electric.

Because of the large number of the entries, contest award winners will be announced in our March issue rather than February as originally announced.

THE NEW ADDITIONS TO SYLVANIA'S FLUORESCENT LINE

LS LAMPS	CURRENT MILLIAMPERES	APPROX. INITIAL LUMENS	LAMP LIFE HRS.
42" T6 	100 200	900 1400	Life of LS fluorescent lamps at 200-milliampere operation is expected to be comparable to that of 40-watt standard fluorescent lamps. Definite ratings will be published as soon as life testing is conclusive.
64" T6 	100 200	1400 2150	
72" T8	100 200	1400 2350	
96" T8	100 200	1950 3300	

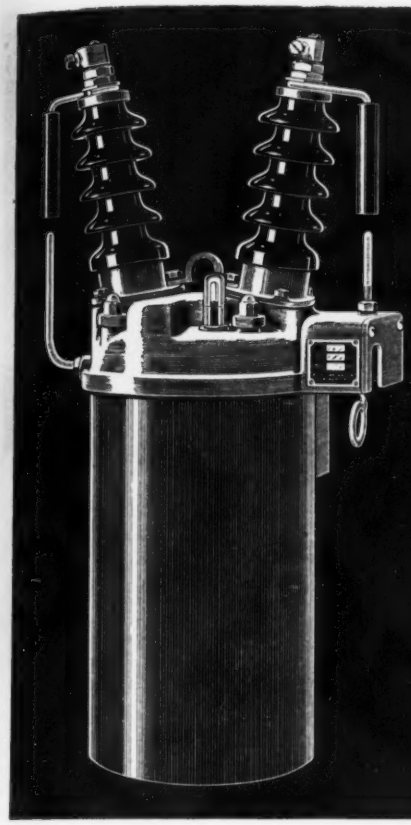
MINIATURE LAMP	CURRENT MILLIAMPERES	APPROXIMATE INITIAL LUMENS	LAMP LIFE, HRS.*
21" T5 	160	Daylight . . . 490 White 580	1500

*Under specified test conditions

SYLVANIA ELECTRIC

SYLVANIA ELECTRIC PRODUCTS INC., Salem, Massachusetts

MAKERS OF FLUORESCENT LAMPS, FIXTURES, ACCESSORIES; INCANDESCENT LAMPS; RADIO TUBES; CATHODE RAY TUBES; ELECTRONIC DEVICES



KYLE

Oil Circuit Reclosers

Kyle Automatic Oil Circuit Reclosers at strategic points on your lines can be counted on to isolate permanent faults to the shortest possible branches . . . keep the revenue producing current going to the main lines and all unaffected branches.

These dual operating characteristics, as exemplified in the Type "H" Kyle Automatic Oil Circuit Recloser, provide:

1. *Fast Opening* of the Recloser on the *First* and *Second* Operations.
2. *Time Delay Opening* of the Recloser on the *Third* and *Fourth* Operations.

Only a Kyle Automatic Oil Circuit Recloser with these dual operating characteristics will clear all temporary faults and also permit the use of additional sectionalizing devices to isolate permanent line faults.

Advantages of Dual Operating Characteristics

1. All temporary line faults, which comprise 90% of line disturbances are cleared AUTOMATICALLY.
2. Service continuity is increased with resultant higher revenue and better customer satisfaction.
3. Outages are confined to the smallest possible area.

Ask your Line Material Representative to furnish you with complete details on the Type "H" Kyle Automatic Circuit Recloser and how it can be used most effectively to protect your system.

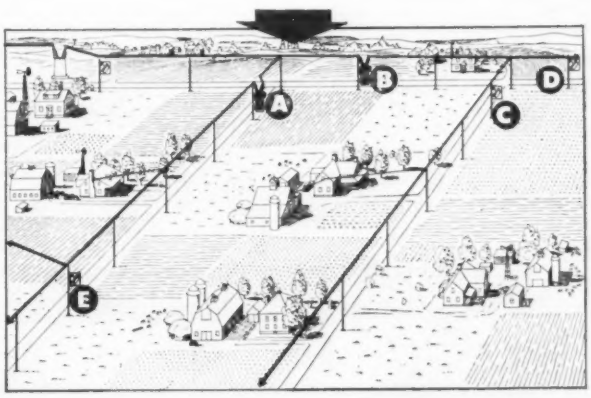
RECLOSER RATINGS: Volts—2400 to 15,000; Amperes—5 to 50; Tripping Current—10 to 100 Amperes; Interrupting Current—150 to 1200 Amperes.

HERE'S HOW IT WORKS:

To protect branch lines from a substation feeder, Kyle Reclosers are located at "A" and "B" to isolate the branches from the main line. Fuses are used on the load side of the Kyle Recloser at "C", "D", and "E" to sectionalize the branch line.

If a fault beyond the sectionalizing fuses is not cleared on the first two operations of the Recloser, it is considered of a permanent nature and the branch line should be isolated by the blowing of the sectionalizing fuse. The Type "H" Kyle Automatic Circuit Recloser permits coordination with the sectionalizing fuse on its third and fourth operations, so that the fuse is blown before the Recloser locks out.

In this way, the line outage is confined to a small portion of the protected system and service is maintained to the remainder of the system.



MADE BY KYLE CORPORATION SOUTH MILWAUKEE WISCONSIN

KYLE Circuit Breakers are Designed and Manufactured for LINE MATERIAL COMPANY

SIMPLEX-ANHYDREX UNDERGROUND CABLES

NEED NO PROTECTION FROM *Moisture*

Underground cables for electrical distribution are exposed to moisture which can cause a lot of trouble and seriously interfere with service. Metallic sheaths will keep moisture out of the cables but they often create other problems of electrolysis, corrosion, sheath losses and maintenance. A flexible, non-metallic covering, such as a rubber sheath, that will not absorb water is the ideal protection.

Simplex-ANHYDREX Underground cables are now made with synthetic insulations and sheaths that are suitable for underground service in ducts or directly in the ground. Exposure to moisture, even permanent submersion in water, has no effect upon their electrical stability. For steady, uniform underground distribution Simplex-ANHYDREX Underground cables are what you need.

Our experience with low water absorption insulations over many years is at your service whenever moisture creates a cable problem for you.

Buna S has replaced natural rubber in Simplex insulations.

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge 39, Mass.

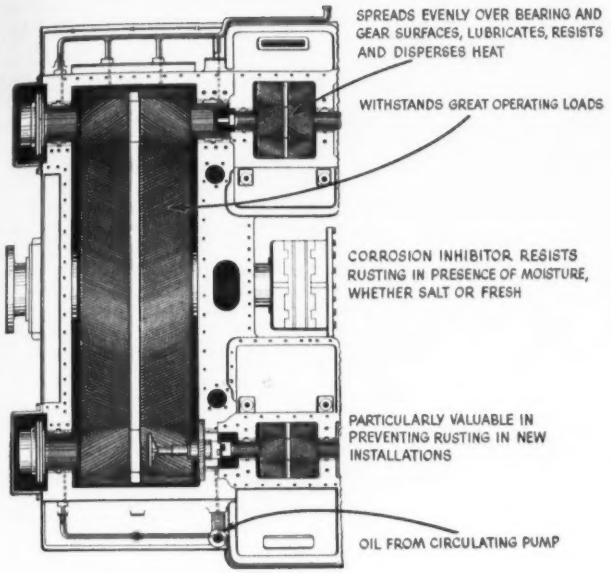
Simplex

WIRES and CABLES

STANDARD ENGINEERS NOTEBOOK

VOL. 2-E No. 1

Compounded turbine oil stops rust damage


SPREADS EVENLY OVER BEARING AND GEAR SURFACES, LUBRICATES, RESISTS AND DISPERSES HEAT
WITHSTANDS GREAT OPERATING LOADS
CORROSION INHIBITOR RESISTS RUSTING IN PRESENCE OF MOISTURE, WHETHER SALT OR FRESH
PARTICULARLY VALUABLE IN PREVENTING RUSTING IN NEW INSTALLATIONS
OIL FROM CIRCULATING PUMP

When rusting is a problem in double reduction steam turbines, either because of sweating or leakage of fresh or salt water, Calol Deturbo Oil 19X is recommended. It eliminates the usual danger of rusting in new installations when first charged, and gives full protection throughout their lives.

Calol Deturbo Oil 19X is a compounded oil, made from selected crudes. It contains a highly effective rust inhibitor. In official tests, steel strips immersed in mixtures of Calol Deturbo Oil 19X and both fresh water and synthetic sea water showed no sign of rusting after 48 hours.

Because of its high film strength, Calol Deturbo Oil 19X carries the heavy weight imposed on turbine bearings, prevents wear and consequent rotor misalignment. It separates rapidly from water with a minimum of sludge formation, and is non-corrosive. Calol Deturbo Oil 19X fully meets U. S. Navy specification for 2190-T turbine oil.

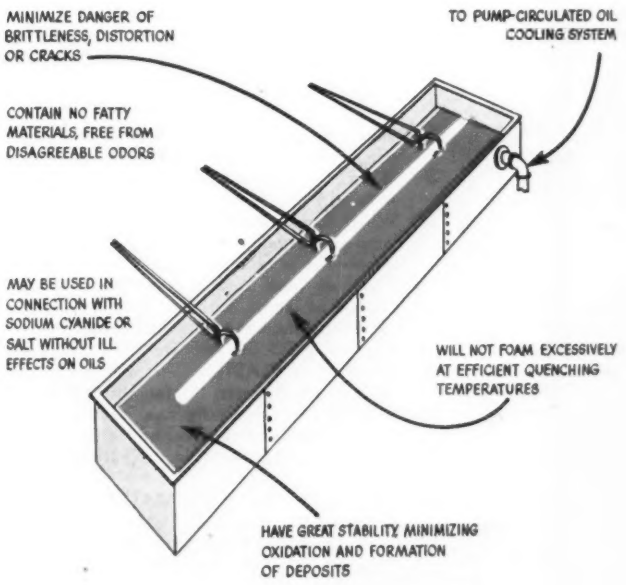
Quenching oils offer better hardness control

Because they retain their original viscosities on continued use, Standard's Calol Quenching Oils maintain a constant quenching speed and produce uniform hardness in steels. Viscosities are low enough so convection currents conduct heat away rapidly, but high enough to prevent excessive evaporation losses.

Calol Alloy Quenching Oil consistently produces higher hardness of alloy steels than ordinary quenching oils. Its outstanding cooling power is based on what is believed to be a new principle. Its use eliminates the chance of brittleness, distortion or cracks resulting from quenching with water.

Calol Quenching Oil, recommended for high-carbon steels, is made from a group of selected mineral oils covering a wide boiling range. They provide a moderate cooling-rate most desirable for these steels.

Both of these quenching oils have great stability, give off no disagreeable odors during use, and are not affected by sodium cyanide or salt.


MINIMIZE DANGER OF BRITTLENESS, DISTORTION OR CRACKS
TO PUMP-CIRCULATED OIL COOLING SYSTEM
CONTAIN NO FATTY MATERIALS, FREE FROM DISAGREEABLE ODORS
MAY BE USED IN CONNECTION WITH SODIUM CYANIDE OR SALT WITHOUT ILL EFFECTS ON OILS
WILL NOT FOAM EXCESSIVELY AT EFFICIENT QUENCHING TEMPERATURES
HAVE GREAT STABILITY MINIMIZING OXIDATION AND FORMATION OF DEPOSITS

Standard Fuel and Lubricant Engineers are always at your service. They'll gladly give you expert help — make your maintenance job easier. Call your Standard Representative or write Standard of California, 225 Bush St., San Francisco 20, California.

STANDARD OF CALIFORNIA

LOOK FOR THIS STARTER

In the *RED PLASTIC* Can

IT LEADS THEM ALL

Pat. Nos. 2200443—2228210

Locks Out . . . Resets AUTOMATICALLY

1 Positively cuts out deactivated, flickering, blinking lamps.
2 When trouble is detected the starter automatically cuts off current to the ballast and lamp.
3 Gives long life to ballast because defective lamp is locked out. Prevents overheating.
4 When Lloyd AUTOMATIC locks out defective lamp—turn off the current—Remove defective lamp—Put in a new lamp.
Allow at least one minute to make the above change of lamps. Turn on the current. The starter automatically lights the new lamp.
NO NEED TO DO ANYTHING TO THE STARTER
5 Lloyd NEW PLASTIC CAN has higher dielectric strength, is stronger, lighter, distinctive.
6 Knurled rim on plastic can insures positive grip for insertion and removal of starter.
7 Plastic can is sealed. No projecting lugs to cause trouble.
8 The life of the AUTOMATIC starter is many times greater than that of the average lamp.
9 It saves maintenance costs and power consumption, protects and insures longer life to the ballast and lamp.
10 Tested in production and prior to shipment to insure perfect performance.

Lloyd Automatic Available in FS-40 and FS-100

LLOYD PRODUCTS COMPANY

Dept. EW-3 Providence 5, R. I.

Representatives in 23 Leading Cities—Export Office: 13 E. 40th St., N.Y.C.

Control Motors (307)

Warren Telechron Co. has developed a timing and control motor with terminal shaft speed of one revolution per hour. This new motor has an input rating of 2 watts and can be furnished in other speeds up to and including six revolutions per hour. A special oil gland has been built into the terminal shaft bearing to extend its life. The terminal shaft is concentric with the outer case of the motor.

A companion model with an eccentric terminal shaft placed normally in the 12 o'clock position in respect to the outer case also has been announced. This design can be furnished at speeds of from 3 to 6 r.p.h.

Wire Markers (308)

Wire markers of polyvinyl extruded tubing are being produced by William Brand & Co. This type of marker is installed by a slip-on assembly operation which is said to be time saving and to eliminate hazard features of other types. It is available in all colors and in clear transparent polyvinyl extruded tubes in any diameter or length. Insulating properties of polyvinyl material are cited as additional safeguards against shorts when using the Turbo system of identifying circuits and leads of energized equipment and controls.

Circuit Breaker (309)

Heinemann Circuit Breaker Co. has added a two-pole circuit breaker, which it claims is smaller, lighter and more compact, has a more efficient blow-out action and faster latch mechanism. The unit is designed for service on 230-volt a-c or 250-volt d-c, 50 amp. maximum. It may be connected either front or rear; will carry full load continuously and has instantaneous trip at eight to ten times full load; has a selection of three time delays. Over-all dimensions are 5¼ in. long, 2-11/16 in. high, 2 in. wide.

Recording Instruments (310)

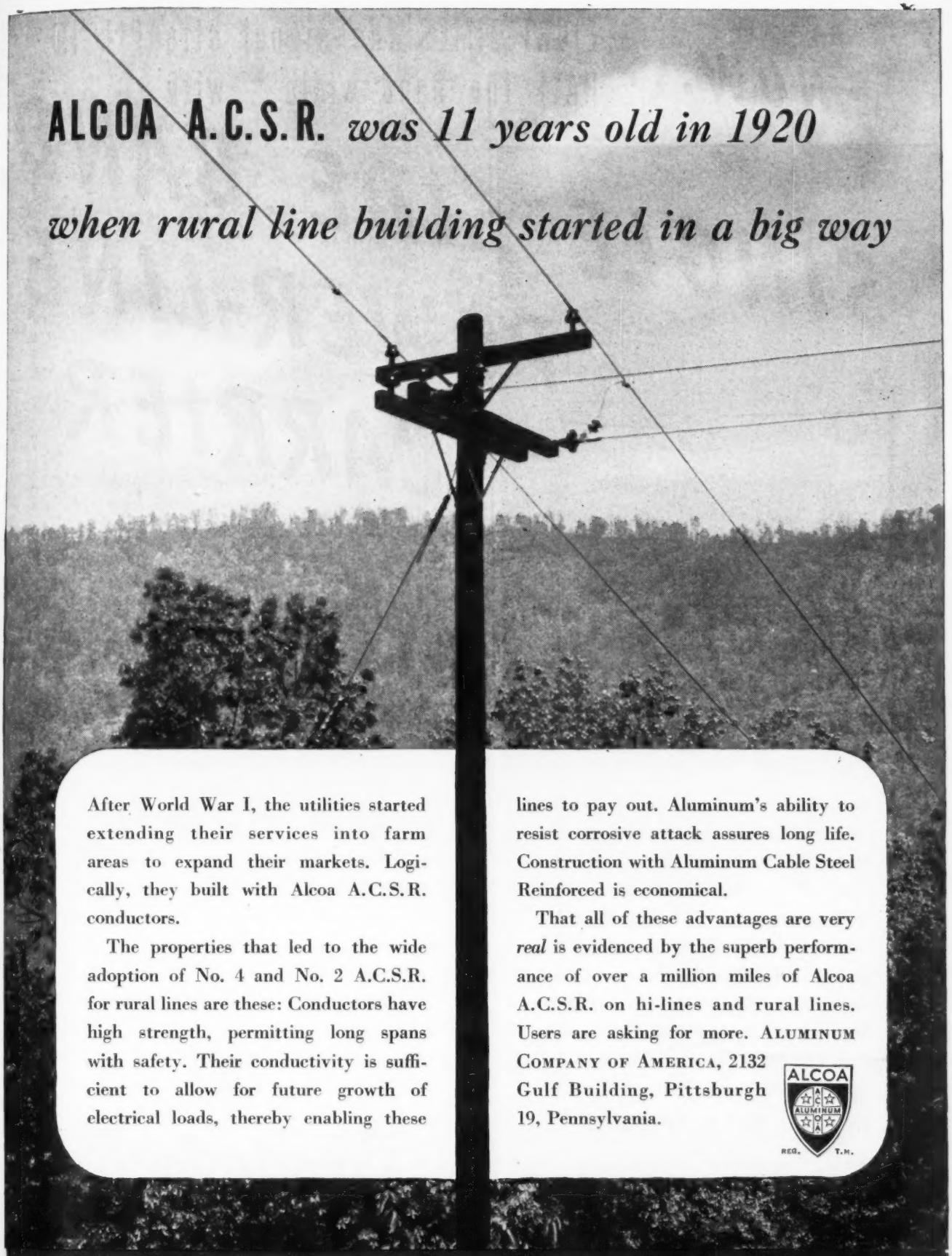
Precision Scientific Co. is offering a new Televac line of recording instruments. Included is the type "MR" with a range of 0-500 microns and the type "S" recorder for ultra vacuum containing two ranges, 0-500 microns for pressures above 1 micron and industrial type ionization gauges for the range 0 to 0.4 microns. Both types incorporate a new Televa No. 500 thermal gauge with specially treated elements. It is stated that accurate readings to 10 -6 mm. Hg. may be secured.

Capacitors (311)

General Electric has added a new line of high-frequency parallel-plate capacitors for use in the resonant circuit of high-frequency oscillators such as those used in electronic heater equipment. When connected in parallel with an inductance coil, this capacitor constitutes the resonant circuit which determines the frequency of the oscillator. Available in standard ratings ranging from 2,000 volts, 0.025 microfarad to 9,000 volts, 0.0056 microfarad.

Tubes (312)

With receipt of G-E license to manufacture grid-controlled rectifier tubes, Taylor Tubes Inc. has announced production of two new tubes, the TT-17 and 873. The TT-17 is comparable to the G-E-FG17 and the latter is an 872A with an added grid control.



ALCOA A.C.S.R. *was 11 years old in 1920*

when rural line building started in a big way

After World War I, the utilities started extending their services into farm areas to expand their markets. Logically, they built with Alcoa A.C.S.R. conductors.

The properties that led to the wide adoption of No. 4 and No. 2 A.C.S.R. for rural lines are these: Conductors have high strength, permitting long spans with safety. Their conductivity is sufficient to allow for future growth of electrical loads, thereby enabling these lines to pay out. Aluminum's ability to resist corrosive attack assures long life. Construction with Aluminum Cable Steel Reinforced is economical.

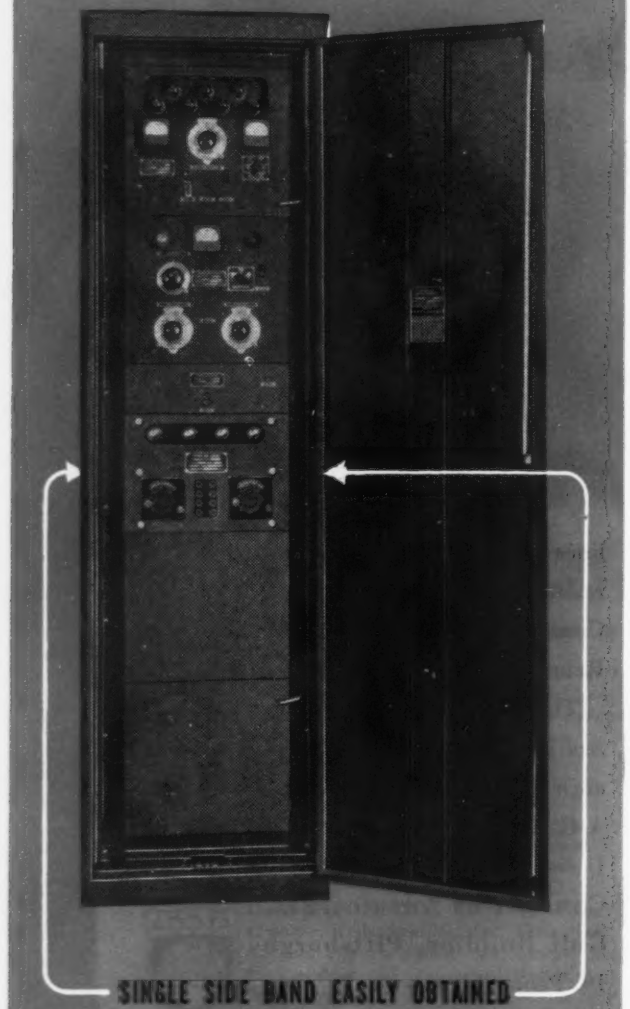
That all of these advantages are very *real* is evidenced by the superb performance of over a million miles of Alcoa A.C.S.R. on hi-lines and rural lines. Users are asking for more. ALUMINUM COMPANY OF AMERICA, 2132 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA A-C-S-R

ALUMINUM CABLE STEEL REINFORCED

NOW... EIGHT TIMES the signal strength in HALF the band width...with

SINGLE SIDE BAND POWER-LINE CARRIER



SINGLE SIDE BAND EASILY OBTAINED

Existing Westinghouse Type JY amplitude-modulated equipment can be converted to Single Side Band transmission by addition of a standard panel to transmitters and receivers. Where present needs can be met by installing Type JY (AM) equipment, Single Side Band conversion equipment can be added at any time as narrower channels and better signal-to-noise ratio are required.

Now available for the first time in practical, simplified form—Single Side Band Power-Line Carrier:

DOUBLES the number of channels available for carrier use. This is the answer to the ever-increasing problem of carrier-spectrum crowding which many users are experiencing.

PROVIDES higher signal-to-noise ratio than any other system occupying double the channel width.

ELIMINATES carrier heterodynes and corona modulation of carrier.

Single Side Band has its principal applications in communication, telemetering, and load control, and for a combination of these functions. It is particularly advantageous where transmission is over long distances and where noise and interference conditions are bad.

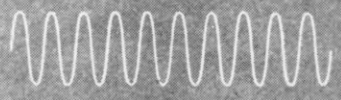
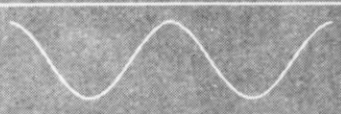
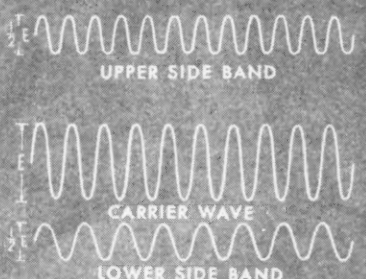
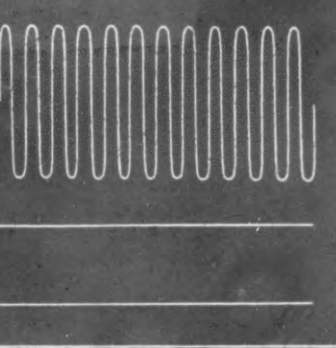
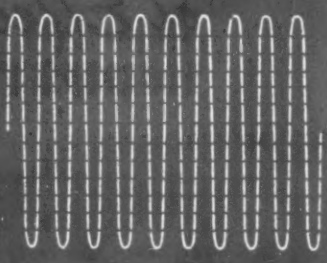
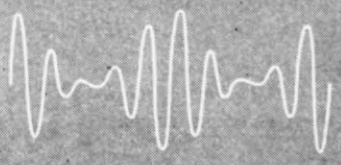
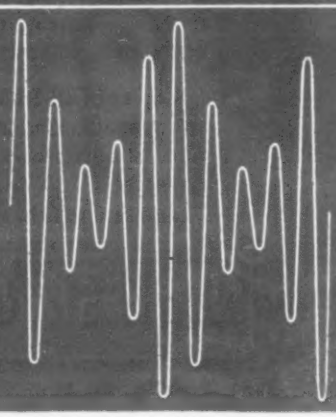
J-97090

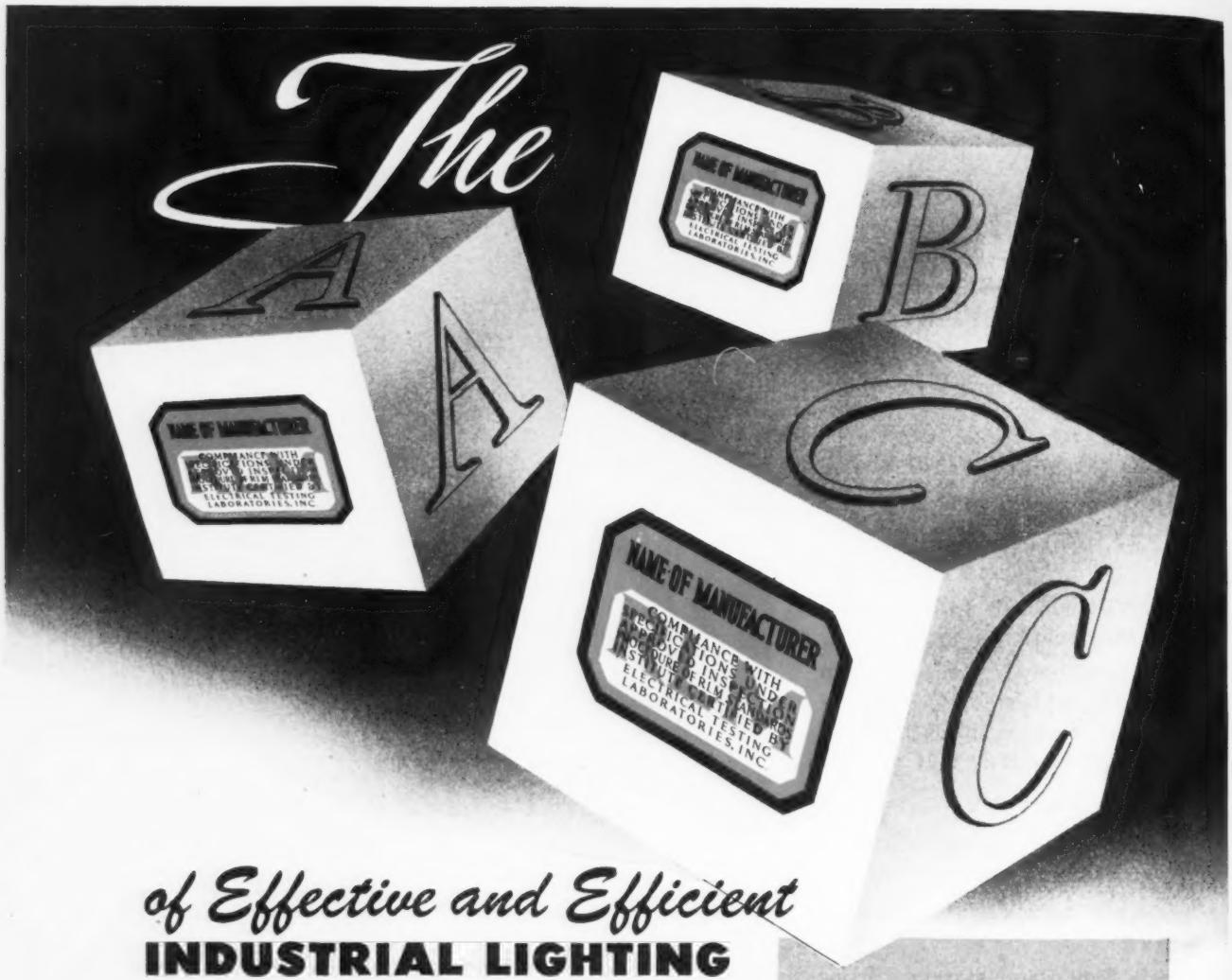
Westinghouse

CARRIER

ENGINEERED . . . BUILT . . . TESTED TO *MATCH* POWER-LINE STANDARDS

HOW THE SYSTEM OPERATES

	AMPLITUDE MODULATION SYSTEM	SINGLE SIDE BAND SYSTEM
1. TRANSMITTED SIGNAL— *no modulation present* Carrier wave present in AM system—no signal at all in Single Side Band.		
2. AUDIO OR MODULATING WAVE Intelligence to be transmitted.		
3. COMPONENTS OF TRANSMITTED SIGNAL— *modulation present* One side band only is transmitted in Single Side Band system, with amplitude equal to total amplitude of carrier and both side bands in AM system.		
4. LOCALLY GENERATED CARRIER WAVE In Single Side Band system, carrier wave is generated at receiving end—not transmitted. As a result, very low power is required to produce equivalent of carrier wave received from other end in the AM system.		
5. BAND WIDTH REQUIRED Single Side Band signals occupy half the band taken by AM. Reducing receiver band width eliminates half the accepted noise power.		
6. RESULTING SIGNAL RECEIVED Sum of incoming side band and locally generated carrier produces a signal in the Single Side Band system equivalent to the AM signal—but with four times the power variations and half the noise, the equivalent of increasing the AM carrier power 8 times.		



# of Effective and Efficient INDUSTRIAL LIGHTING

There is a simple and safe way to buy industrial lighting units you can depend upon. Look for the RLM LABEL!

To qualify for this certificate of merit, the unit must conform in every particular to an official specification developed by RLM Standards Institute...a non-profit organization dedicated to the development and consistent improvement of industrial lighting equipment and practice.

RLM Official Standards Specifications cover vital construction and performance factors for both Incandescent Lighting Units and Fluorescent Lighting Units. Periodic testing and inspection by Electrical Testing Laboratories at the plant of all manufacturers authorized to supply RLM Certified Industrial Lighting Units is your positive assurance that a unit bearing the RLM Label provides the maximum in lighting efficiency and economy.

Copies of all RLM Specifications may be secured through any manufacturer utilizing RLM inspection and certification, or direct from RLM Standards Institute.

The Letters RLM Stand for Reflector and Lighting Equipment Manufacturers

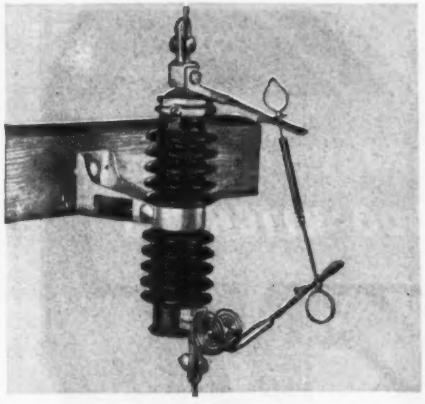
RLM STANDARDS INSTITUTE SPECIFICATIONS

RLM Specification No. 1 — *Dome Reflector*
RLM Specification No. 2 — *Deep Bowl Reflector*
RLM Specification No. 3 — *Symmetrical Angle Reflector*
RLM Specification No. 5 — *48" Fluorescent Two-Lamp Closed-End Porcelain Enamel Unit*
RLM Specification No. 6 — *48" Fluorescent Three-Lamp Closed-En Porcelain Enamel Unit*
RLM Specification No. 7 — *60" Fluorescent Two-Lamp Closed-End Porcelain Enamel Unit*
RLM Specification No. 8 — *60" Fluorescent Two-Lamp Closed-End Porcelain Enamel Diffuser Unit*
RLM Specification No. 9 — *48" Fluorescent Two-Lamp Open-End Porcelain Enamel Unit*
RLM Specification No. 10 — *48" Fluorescent Three-Lamp Open-End Porcelain Enamel Unit*
RLM Specification No. 11 — *60" Fluorescent Two-Lamp Open-End Porcelain Enamel Unit*
RLM Specification No. 12 — *60" Fluorescent Two-Lamp Open-End Porcelain Enamel Diffuser Unit*
★**RLM Specification No. 18 —** *Glassteel Diffuser*
★ New RLM Approved Unit

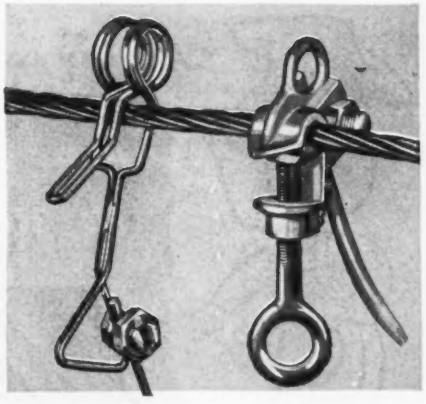
RLM STANDARDS INSTITUTE
INCORPORATED

307 N. MICHIGAN AVE. SUITE 420 CHICAGO 1, ILL.

FUSE LINKS—individually wrapped, then packaged again in packets of five, arrive at the pole just the way they leave the Kearney factory.



LOW MASS, extra-flexible switch parts mean high resistance to mechanical shock and heavy short-circuit rupturing capacity.



CLAMPS. There is a Kearney Con-nec-tap clamp for the most unusual load or construction problem. Made in many types for all wire sizes.

COMBAT LIGHTNING THE EASY WAY

Are you trying to combat lightning discharges the hard way? You are if you're using devices that attempt to choke surges by interposing a high resistance in the path to ground. This method has the effect of keeping a high percentage of the surge on your lines where it may spill over bushings, line insulators or break through transformer windings. In consequence these choked and reflected surges are the direct cause of the many outages from fuse link blowings if not more serious damage, after lightning storms.

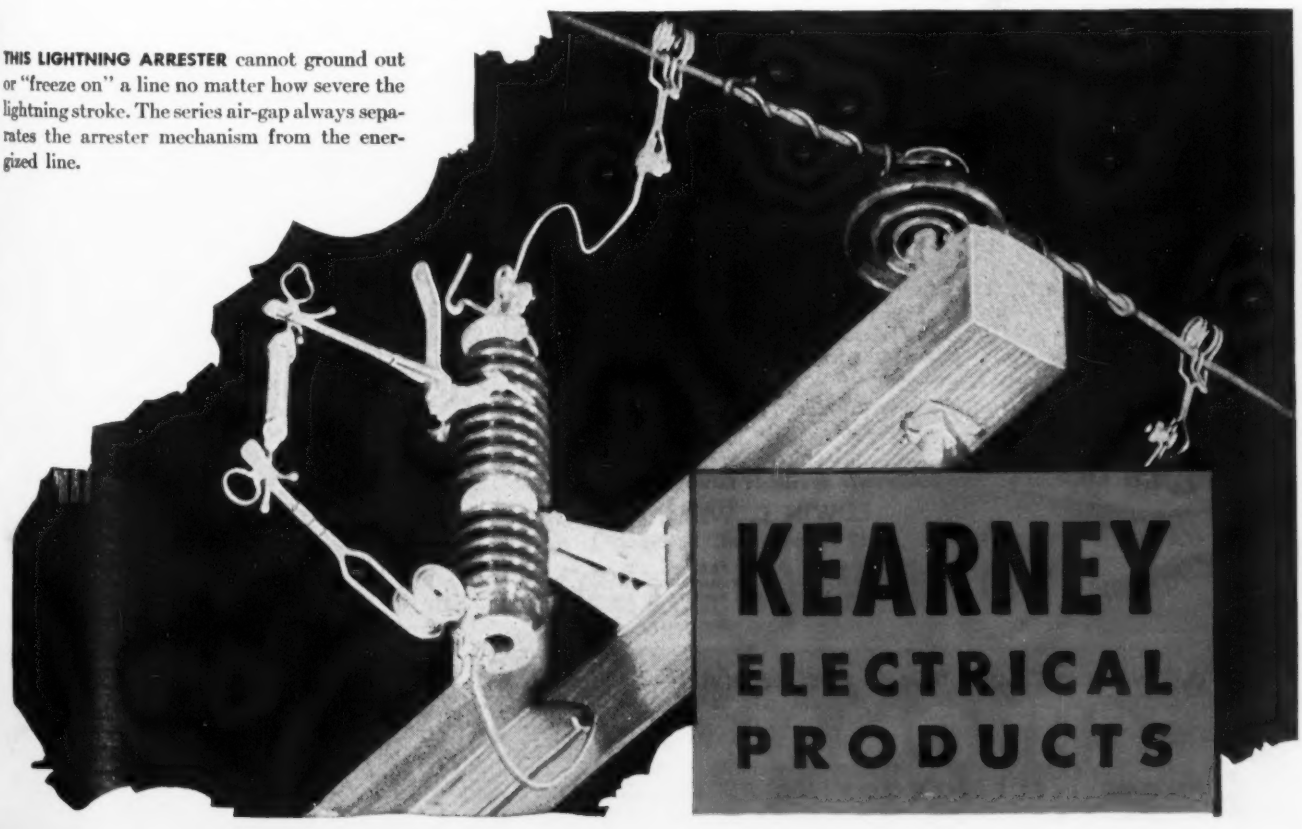
The easy way is to direct lightning surges to ground through a low resistance path so that all of the surge, electrical stress and reflected voltage is drained to ground within a fraction of a microsecond. Power follow-ups are snuffed out usually within the first current zero and your lines will operate through many lightning storms without even blowing a fuse link. This is what you may confidently expect when you change to Kearney Lightning Arresters. What's more you start off with the initial advantage of paying much less for the Kearney Arresters—and they will continue to pay dividends by reducing fuse-blowings, trouble-trips and lightning outages to a new low.

Please address your letter to Department "H".

JAMES R. KEARNEY CORPORATION
4236 Clayton Avenue, St. Louis 10, Missouri

PRACTICAL—SERVICEABLE—DEPENDABLE

THIS LIGHTNING ARRESTER cannot ground out or "freeze on" a line no matter how severe the lightning stroke. The series air-gap always separates the arrester mechanism from the energized line.



Chromy says
"HERE'S WHAT'S COOKING IN 30,000 KITCHENS"
CHROMALOX
CHROMALOX DESIGN
for better cooking
Cross section of Inconel sheathed tube shows how Chromalox provides maximum contact cooking surface.
It's the CHROMALOX Tubular
It's got SPEED
It's got EASY CLEANING
It's got LONG LIFE
It's got ECONOMY

THE UNIT THAT GETS *HOTTER, QUICKER* because of its special Chromalox refractory—its heat concentrating baffle, which ***does not touch the range top,*** nor transmit heat to it.

Every Chromalox tubular unit on the ranges of your customers is a goodwill representative for you and your service—a constantly active reason why they should give you ***all*** their business.

Famous Chromalox Tubulars will soon again be available.

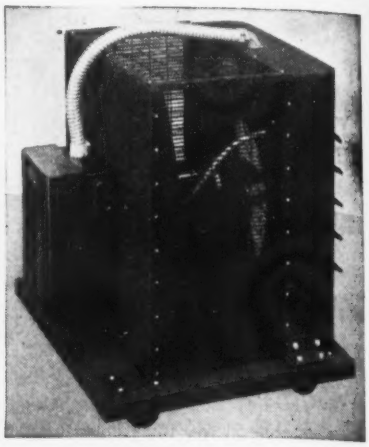
Chromalox Superspeed and Heatflo—to fit any range—are available now.

EDWIN L. WIEGAND CO.
7540 Thomas Blvd., Pittsburgh 8, Pa.

MONTGOMERY BROTHERS: 61 Fremont St., San Francisco 5, Calif.; 911 Western Ave., Seattle 4, Wash.; 2333 N. W. Westover St., Portland 10, Ore.; 420 S. San Pedro St., Los Angeles 13, Calif.—THE PETERSON CO.: 1925 Blake St., Denver 2, Colo.

on new ranges and for replacements
CHROMALOX
makes ELECTRIC COOKING AT ITS BEST!

Portable Heater (313)



Electric Air Heater Co. has a new portable model heater for locations where heat is required at certain periods only. Heater elements, fan motor, contactor and switch are mounted on one base, which is provided with castors. Shown in the 20-kw. heater.

Fan Propellers (314)

Dynamic Air Engineering, Inc., has added to its line of axial flow fan units, a 60-in. and 2-in. propeller. The 60-in. low-pressure propeller is driver with a 10-hp. 1,150-r.p.m. motor and delivers approximately 60,000 cfm. free air and 5,000 cpm. at ½ in. S.P. The midget propeller has been developed for a complete fan unit to be marketed by Dynamic company and to be powered by a motor of approximately two-thousandth horsepower. It will deliver 30 cfm. at .30 in. S.P.

Prefabricated Panels (315)

Bailey Meter Co. is making prefabricated boiler control panels including all necessary connecting piping and electrical wiring for operation of metering equipment and boiler control systems. Small units and the more sturdy and light-weight instruments are mounted and connected ready for service. Heavy instruments or those having delicate mechanisms are shipped separately but cut-out spaces, drilling and all necessary connections are provided.

Latex (316)

United States Rubber Co. has developed a new synthetic rubber latex, a modification of the butadiene-styrene type. Advantages are said to be greater uniformity and more easy handling and shipping. Since it mixes well with other ingredients, it is easily compounded for uniform viscosity and other desired properties, the announcement states.

Relays (317)

H. B. Electric Co. has announced an improved series of normally open mercury plunger relays. The new design is said to more than double the effective length of the plunger with an increase of ¼ in. over-all length of the mercury tube. Another feature is that the arc is broken over a new hardened ceramic material which eliminates powdering.

Resistors (318)

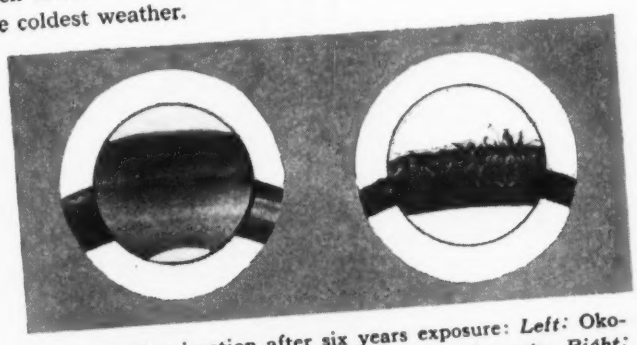
Stackpole Carbon Co. has announced new insulated resistors designed to meet recently issued Army-Navy specifications. These units are available in 1/3-, ½- and 1-watt sizes in all required ranges.

why OKOPRENE protection gives longer life to ELECTRICAL CABLES

Okoprene, compounded with neoprene, is an exceptionally durable covering for cables developed in the Okonite Research Laboratories. It can be bonded to the rubber insulation of individual wires or can be applied as a sheath or jacket over the core of multiple conductor cables. It can be used to protect practically any type or design of cable.

Since 1931, proving ground tests and field experience with millions of feet of wire have been emphasizing the stability and long life of Okoprene coverings under widely varied conditions.

WEATHER RESISTANCE — (Aerial cables, exposed wiring) Okoprene sheaths will not rot or deteriorate when subjected to moisture. The protective covering is flexible at temperatures even lower than minus 18°C. (0°F.) and may be handled in the coldest weather.



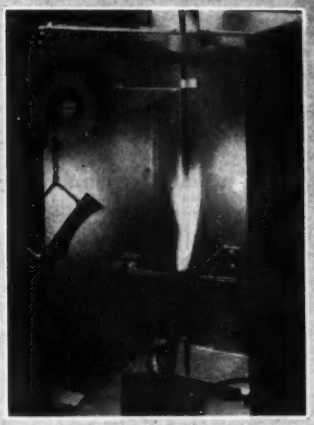
Relative deterioration after six years exposure: *Left:* Okoprene sheath smooth and unchanged by elements. *Right:* Saturated braid with compound eroded and braid destroyed.

CHEMICAL RESISTANCE — (Cables exposed to fumes or chemicals) The Okoprene jacket has excellent resistance to most acids, alkalies and other corrosive chemicals.

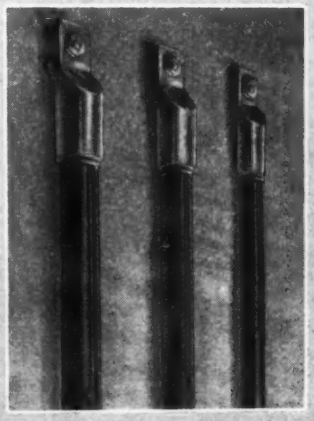
OIL RESISTANCE — (Portable cords, machine tool and shop-wiring, etc.) When exposed to the solvent action of petroleum products, Okoprene sheaths retain their full mechanical strength.

ELECTRICAL STRENGTH — Okoprene itself is an insulating material and thus gives added electrical protection as contrasted with fibrous coverings. When applied over metallic coverings, it protects them from electrolysis. Okoprene will not carry static charges, but does prevent current leakage at terminals and eliminates danger from electric shock.

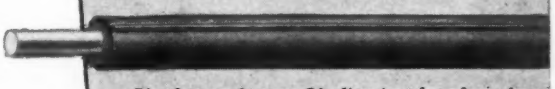
ENGINEERING HELP — Our experience in dealing with electrical problems since 1878 is at your disposal. For further details on Okoprene protection or other data on cables, we suggest you consult your Okonite representative — or write The Okonite Company, Passaic, New Jersey.



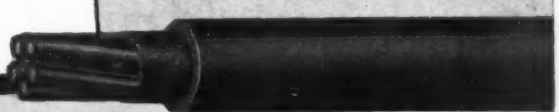
NON-FLAMMABILITY — Okoprene coverings do not support combustion.



FREEDOM FROM "SURFACE CHECKING" — Okoprene coverings, which are bonded to the insulation, protect the rubber insulation up to the terminal and prevent "sun checking" or surface cracks.



Single conductor Okolite insulated and Okoprene protected wire.



Multi-conductor cable with Okoprene covering over each insulated conductor. Okoprene sheath over all.

OKONITE insulated wires and cables

3942

How to change America's biggest industry

America's biggest industry awaits electrification after the war.

That industry employs more people than any other—at least one member of every family.

That industry spends more money than any other—approximately 30 billion dollars a year.

That industry is *housekeeping.*

Your opportunity

Taking care of the home is still pretty much in the handicraft stage. There are, of course, many wonderful electrical appliances to save the housewife steps, time, and money. But only a small fraction of American homes employ these appliances to their fullest extent.

The job—for utility companies as well as appliance manufacturers—*is to tell the housewife how she can do her work, quicker, better, and easier by electricity.*

How many women in the communities you serve are convinced

- that an electric range cooks cleanly, coolly, and completely unattended?
- that a flatplate ironer can do in three hours the work that now takes her six? And that the operator can sit down and remain cool while she's working?

into Kilowatt Hours

• that a washing machine has the strength of 13 women? That it can eliminate blue Monday forever at an operating cost of one dollar a year?

Facts like these are the dynamite that will blast the old-fashioned conception of "woman's work is never done" from the American scene. Facts like these will build a power outlet to replace war industries.

The job to be done

Utility companies . . . both those who sell at retail and those who promote through retailers . . . will want to step up their educational campaigns.

General Electric . . . through its Consumers Institute . . . through its Home Bureau . . . through nationwide publication advertising . . . through one of the largest daytime radio programs on the air . . . and through other educational efforts, has been pushing these ideas.

During 1945, General Electric appliance advertising . . . with a total of 665,391,793 impressions in consumer magazines . . . will carry forward this campaign.

Our radio program "The G-E House Party" will have a potential audience of 28,000,000 radio homes.

Your co-operation* with us in this program of education for electrical living will go a long way toward making the American Home of tomorrow an all-electric home. General Electric Co., Appliance and Merchandise Department, Bridgeport, Conn.

For Victory—General Electric is working night and day to back the attack. You can help, too, by buying and holding more war bonds than before.

*Public utilities can cooperate today by sending to their customers announcement materials featuring "The G-E House Party" which are available free of charge.

Tune in: *"The G-E House Party," every afternoon, Monday through Friday, 4 p. m., E.W.T., CBS.*
"The G-E All-Girl Orchestra," Sunday, 10 p. m., E.W.T., NBC.
"The World Today" news, every weekday, 6:45 p. m., E.W.T., CBS.

• RUBBER POWER CABLES • VARNISHED CAMBRIC CABLES • BUILDING WIRE • SERVICE ENTRANCE CABLE • CRESFLEX NON-METALLIC SHEATHED CABLE • ARMORED CABLE •

CRESCORD

RUBBER JACKETED PORTABLE CORD

For Long Service On Tough Jobs

Improvements in Buna-S (Government Synthetic Rubber) and the development of better manufacturing methods have resulted in an excellent portable cord, comparing favorably with CRESCORD, formerly made with crude rubber which over many years had earned such an outstanding reputation for long life.

CRESCENT

WIRE and CABLE

NEMA

CRESCENT INSULATED WIRE & CABLE CO.
TRENTON, N. J.

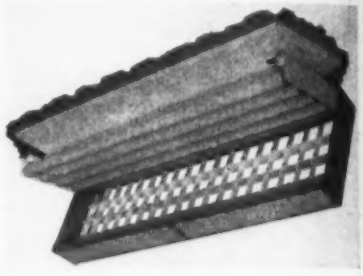
• IMPERIAL NEOPRENE JACKETED PORTABLE CABLES • PERMACORD • LEAD-ENCASED AND PARKWAY CABLES • SYNTHOL WIRES • WELDING CABLES • SHIPBOARD CABLES •

Combination Grill (319)

Calkins Appliance Corp. is displaying the Breakfaster, a combination hot plate and grill which it will manufacture postwar. Designed to prepare toast and coffee at the same time, it has a single electric element, located near the top, for both cooking and toasting functions. The upper surface of the unit forms a hot plate and a compartment below serves as a grill. The unit weighs 2½ lb., operates from 110-volt a-c or d-c. It probably will sell at less than $15, the manufacturer states.

F Fixture (320)

A fluorescent lighting fixture equipped with a hinged shield for easy maintenance is announced by R. & W. Wiley Inc. It is made in four models including both ribbed glass glare shield and louvered types, industrial and commercial designs with 2, 3 and 4 tubes and starter or instant type ballast. It can be installed either in single fixture or continuous runs.



F Ratings (321)

Westinghouse has announced new fluorescent life ratings, based on information from service and laboratory tests. With the announcement was a warning that, because of depreciation in light output, for most lighting services use of fluorescent lamps beyond 6,500 hours is not economically justified.

The new life ratings:

F Lamp	Burning Hours per Start	Rated Average Life* (Hours)	Approximate % of Initial Lumens per Watt at 70% of Rated Life
6-watt	..	1,500	75
8-watt	..	1,500	75
15-watt (T8)	3	2,500	78
	6	4,000	72
	12	6,000	69
15-watt (T12)	3	2,500	84
	6	4,000	76
	12	6,000	70
20-watt	3	2,500	84
	6	4,000	76
	12	6,000	70
30-watt	3	2,500	78
	6	4,000	72
	12	6,000	69

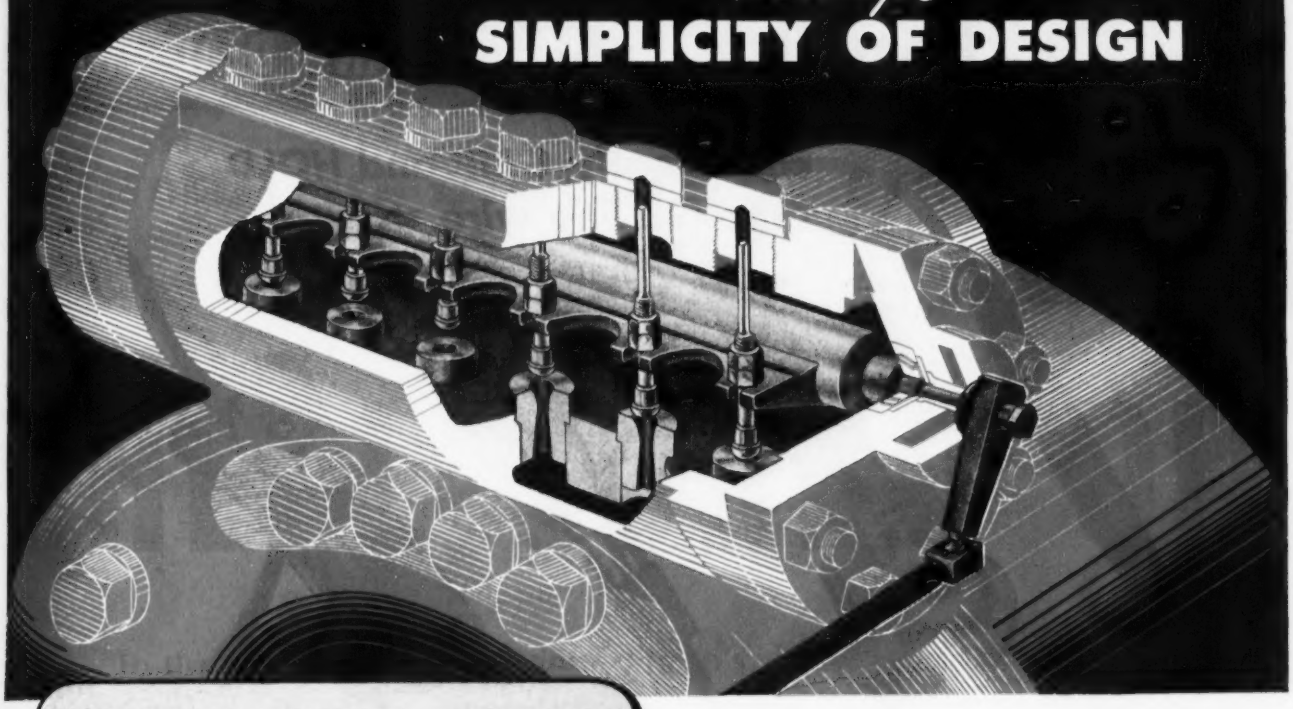
* Life under specified test conditions. This includes such factors as operation on a-c circuits at rated voltage, the use of starters and ballasts, or transformers of proper design.

Lamp Prices (322)

Westinghouse has announced list prices of the new slimline F lamps to be manufactured as soon as war conditions permit. These high efficiency hot cathode lamps will be available initially as follows:

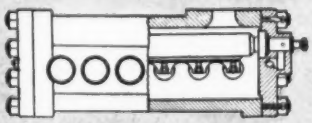
Length	Diameter	Price
42 in.	¾ in.	$1.55
64 in.	¾ in.	1.75
72 in.	1 in.	2.00
96 in.	1 in.	2.70

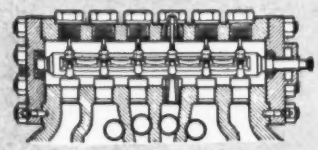
SENSITIVITY OF CONTROL *through* SIMPLICITY OF DESIGN



This HENDY Turbo-Generator feature will pay you dividends

The steam-control valve mechanism of the Hendy turbo-generator is operated by a rocker shaft. In this design there are no valve stems or lifter-bar mechanisms passing through the steam chests; thus friction loss is eliminated and the sensitivity of the system is correspondingly increased. The stainless-steel rotating shaft that lifts each valve successively from its seat is carried in nitrided bearings, insuring *free* operation in high temperatures and eliminating shaft stuffing or packing boxes.

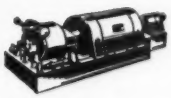




Because of the extreme simplicity of this design, valve adjustments are easily made, and heavy rocker arms, lengthy control linkages, and wasteful steam leakages are eliminated.

This worth-while Hendy feature is only one of many that contribute to lower maintenance costs, greater efficiency in operation—that pay you dividends. Watch succeeding advertisements for details of other dividend-paying Hendy features.

Further descriptive information is available. When requesting detailed information and prices please indicate electrical requirements, steam conditions, and type of service involved.



Developed recently to meet war needs for a matched turbo-generating set of utmost reliability, Hendy turbo-generators are setting new high standards of performance. By simplification of design *throughout*, operating efficiencies are *raised* and maintenance and service problems are *reduced.* Built in one of America's best equipped shops by a corps of skilled craftsmen, these units feature many advancements in turbine, reduction-gear and generator design . . . combined into one complete plant that has received immediate approval by operating engineers.

Hendy turbo-generating plants are available for marine or stationary applications in sizes from 250 to 750 kw. Investigate *now* the many advantages to you of installing Hendy equipment.

JOSHUA HENDY IRON WORKS
ESTABLISHED 1856

SUNNYVALE, CALIFORNIA

54-TH-6

Branch Offices: BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DETROIT • HOUSTON • LOS ANGELES • NEW YORK • PHILADELPHIA • PITTSBURGH • SAN FRANCISCO • ST. LOUIS • WASHINGTON

1ST TEST OF A SERIES

proves that Reliable STRAIGHTLINE SPLICES AND DEAD ENDS

consistently GRIP and HOLD the full line wire strength

Your assurance of an extra margin of strength and service in Reliable Connectors, Splices and Deadends is the routine, accurate check of the physical properties of both the raw materials used and the finished product produced. Precise quality control insures a gripping surface much harder than the wire. Note the results of a routine Straightline Splice tensile test above.

Seeing is believing—watch for other test proof

1. Gripping Test
2. Vibration Test
3. Corrosion Test
4. Conductivity Test

Above photograph shows laboratory technician testing hardness of gripping jaws of Reliable Straightline Splices

RELIABLE ELECTRIC COMPANY

3145 Carroll Avenue, Chicago 12, Illinois

OVER 35 YEARS SERVICE TO THE UTILITIES

40,000 HOURS

in turbo blower of steel mill —and still no breakdown in

SHELL TURBO OIL

In-use tests have proved Shell Turbo's ability to resist structural breakdown to an unprecedented degree. For instance, Turbo survived with no sign of breakdown 40,000 hours in the turbo blower of a steel mill—8 times the life of other oils. Equally grueling tests in other types of turbines have confirmed this superiority.

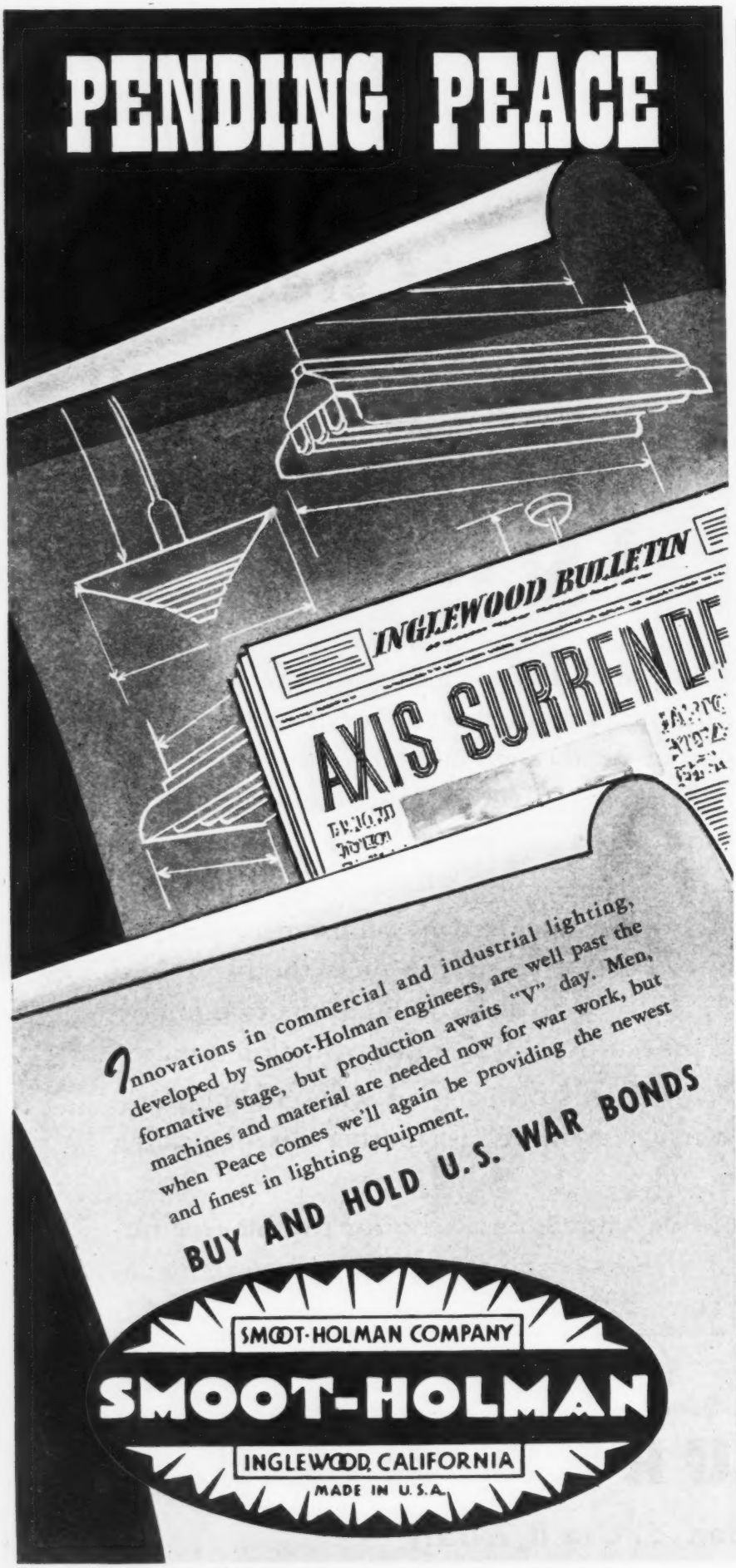
But—the ability to take such terrific punishment isn't the only "extra" in Turbo. First of its type to meet the Navy's exacting specifications, Shell Turbo also combines the two important qualities of rust prevention and superior oxidation stability.

High "Film Tenacity," the property of withstanding moisture and other adverse conditions, is another distinguishing mark of this turbine oil.

Get the habit of depending on Turbo for trouble-free turbine maintenance. And look to Shell for all your needs in industrial lubricants. Shell Oil Company, *Incorporated.*

SHELL TURBO OIL

Oil Is Ammunition . . . Use It Wisely



Innovations in commercial and industrial lighting, developed by Smoot-Holman engineers, are well past the formative stage, but production awaits "V" day. Men, machines and material are needed now for war work, but when Peace comes we'll again be providing the newest and finest in lighting equipment.

BUY AND HOLD U.S. WAR BONDS

SMOOT-HOLMAN COMPANY
SMOOT-HOLMAN
INGLEWOOD, CALIFORNIA
MADE IN U.S.A.

Offices in Principal Western Cities—Branch and Warehouse in San Francisco

Capacitors (323)

General Electric is making a new line of high-frequency paper-dielectric capacitors in ratings of 5,000 to 20,000 volts d-c, 0.01 microfarad. They were designed primarily for grid- and plate-blocking service in the electronic-oscillator circuits of high-frequency induction heating equipment but can be used in other high frequency oscillator circuits of a similar nature, the manufacturer states.

The internal kraft paper and aluminum foil assemblies, impregnated with a low-loss liquid dielectric, are hermetically sealed in rectangular metallic cases. Size of the case cover and the over-all dimensions of the capacitor are reduced by use of a single insulated terminal, provided with a threaded terminal stud. For the other terminal, a stud is provided for connection to the case cover. The units are supplied with removable footed type brackets, which provide for a firm four-point mounting in any position. The 20,000-volt rating is available in two designs, one in a plain case and the other with cooling fins.

Panel Instruments (324)

Roller-Smith has a new line of 1½-in. panel instruments available in d-c voltmeters in all practical ranges above 50 millivolts and in d-c ammeters above 500 microamperes. According to the announcement, they were designed to withstand extreme conditions of temperature, humidity, vibration and shock in aircraft service; will maintain a service accuracy of 2% and withstand hydrostatic pressures up to 14.7 psi. without case leakage.

Wiring Kit (325)

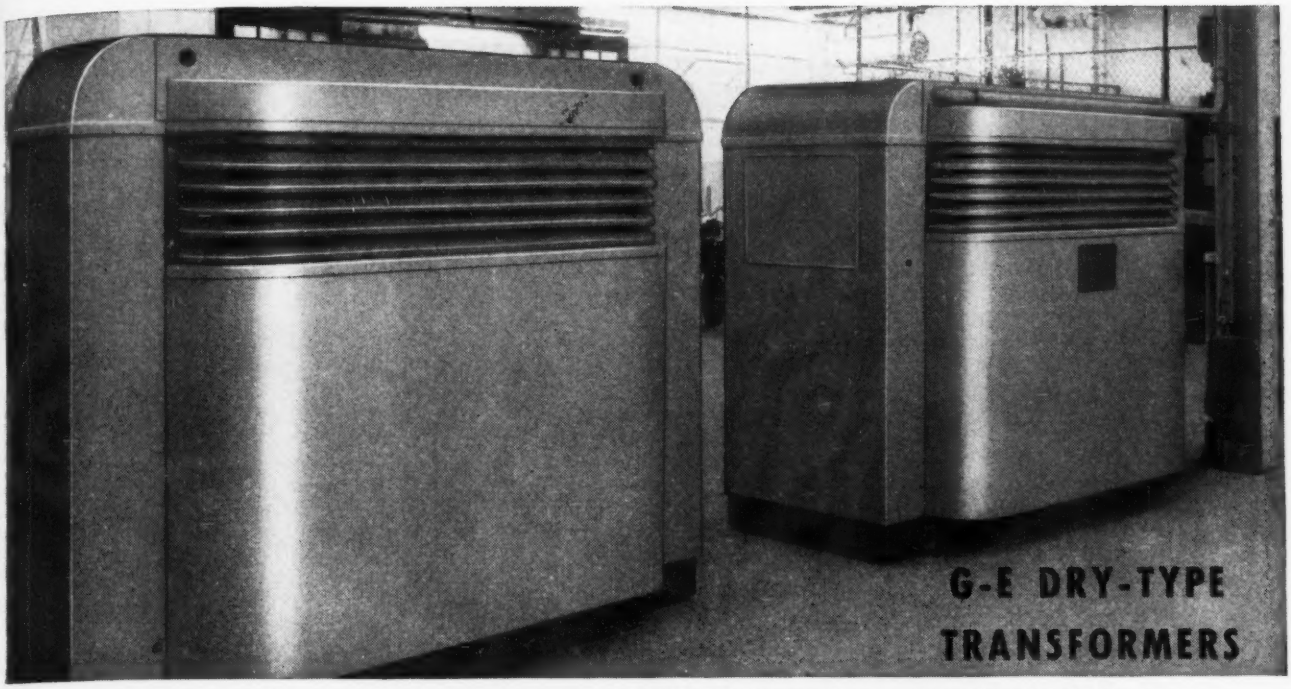
Aircraft-Marine Products Inc. is offering an electrical wiring kit for general solderless wiring. Included are a tool which cuts and strips the wire, indicates stud sizes and crimps terminals to the wire; an assortment of 100-amp. solderless terminals.

Vacuum Nozzle (326)

Electric Vacuum Cleaner Co. has announced that its postwar Premier will have a new type nozzle called the Matho-Matic which will adjust itself automatically to the correct distance above the rug for efficiency.

Rheostats (327)

Ohmite Mfg. Co. has announced the Model J, 50-watt, and the model H, 25-watt, rheostats. Operating temperature range of these units is −67° F to +158° F. The units are linear or taper wound in various resistances.



As up-to-date as the product they help manufacture—two G-E 150-kva dry-type transformers at a newly equipped factory

6 UNIQUE FEATURES

set new standards for dry-type designs— in safety, ease of installation, appearance

1 A case designed for utility, that is attractive in appearance.

2 Completely metal-enclosed construction that prevents rods and wires from being accidentally pushed into live parts of the transformer.

3 No exposed live parts, such as bushings, that would neccesitate enclosing the unit with a fence to protect personnel.

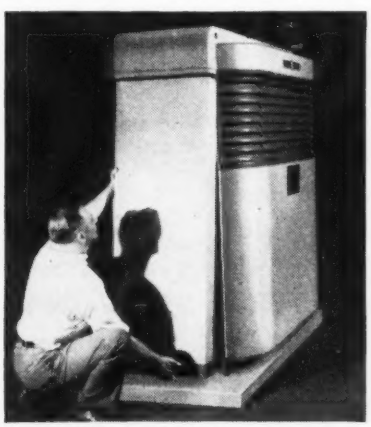
4 Cable terminal compartments completely removable, so that the high-voltage and low-voltage cables can be made up and the unit then slid into place between them without the use of a crane or elaborate hoisting and jacking facilities.

5 Readily removable casing to facilitate inspection and cleaning of the core and coils.

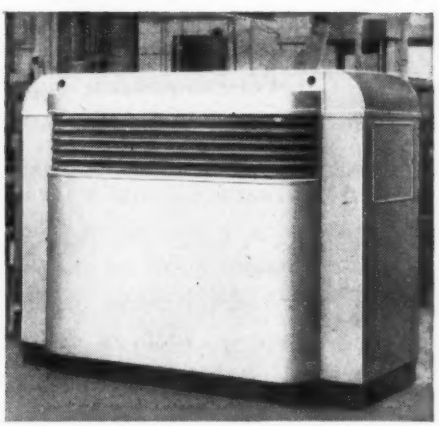
6 Transformers equally suitable for top or bottom connection. Can be equipped with a high-voltage pothead, if desired. Low-voltage terminal facilities are suitable for either cable or bus-duct connections.

These ultramodern distribution transformers are designed to meet AIEE Standards No. 1 for Class B insulation, with 130 C maximum hot-spot temperature in a maximum ambient of 40 C, resulting in an average temperature rise of approximately 65 C. They are now available for use on 601- to 15,000-volt primary circuits, in ratings from 100 to 2000 kva. For further details ask for Bulletin GEA-3714B. General Electric Company, Schenectady 5, N. Y.

Dry-type load-center unit substations are also available. This 750-kva unit steps down 2400 volts to 480 volts at a Southern metals plant.



H-v and l-v terminal compartments are easily removed. They eliminate the hazards of exposed bushings and wiring.



Transforms 2400 volts to 575 volts for machine tools and other factory loads at a New England plant.

GENERAL ELECTRIC

BUY WAR BONDS

402-67-5100

Ruralductor came to stay.

By filling a definite need, this stranded steel conductor has proved itself during the war years. It will be doing a still bigger job in the era of peaceful tomorrows.

Comparative figures have proved beyond question that Ruralductor effects outstanding economies where secondary feeders and tap mileage predominate. Being of steel, Ruralductor possesses the strength that makes possible longer spans, hence a reduction in the number of pole structures needed.

That is the reason for its basic economy, since a non-ferrous line of equivalent strength would be unnecessarily costly for most rural mileage. Ruralductor's electrical capacity, while of course somewhat less than that of non-ferrous conductors, is entirely adequate for most farm districts not yet electrified.

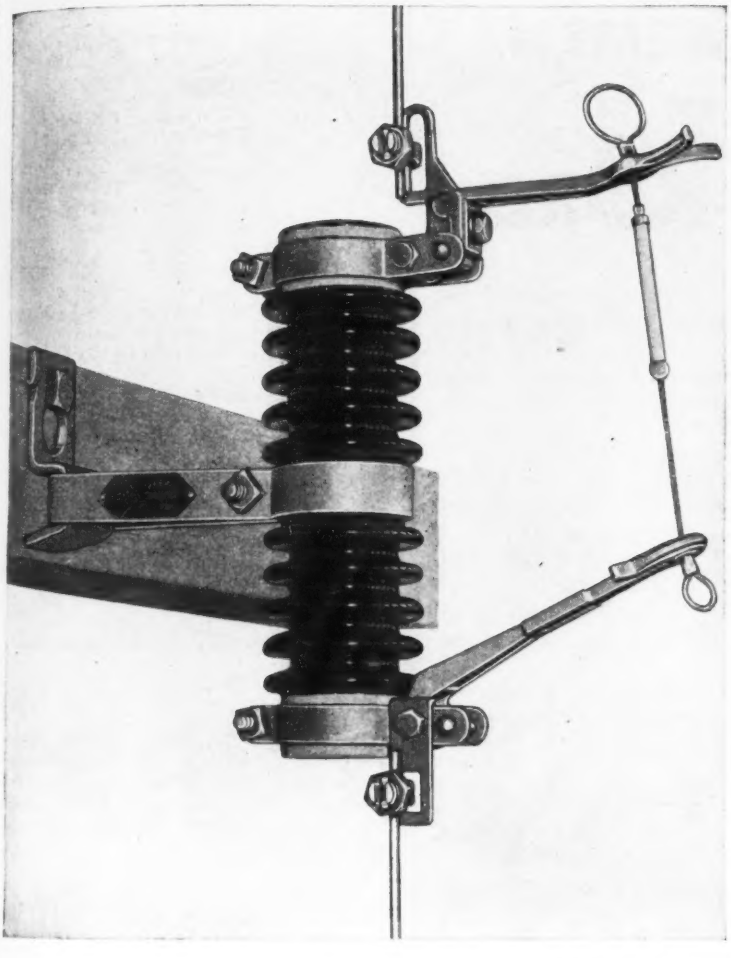
As a protection against corrosion, Ruralductor is bethanized—guarded against corrosive action by a smooth, uniform zinc armor of high purity. The bethanizing process, used exclusively by Bethlehem, creates coatings in three different weights—A, B, and C. This is a distinct advantage, as it enables the user to select the proper coating weight for corrosive conditions in any given area.

Let a Bethlehem representative explain how Ruralductor will save money in farm-electrification programs. You'll find plenty of precedent for including it in both your present and postwar planning

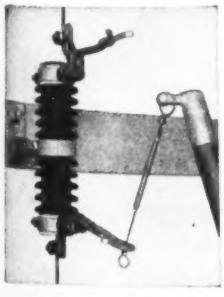
RURALDUCTOR

BETHLEHEM STEEL

STURDY–LOW COST MATTHEWS PROTECTOLINK CUTOUTS



Catalog 1640-50 Amp. 7.5/12.5 KV. Grd. Y — Catalog 1641-50 Amp. 15 KV.



Write for Bulletin 101-A

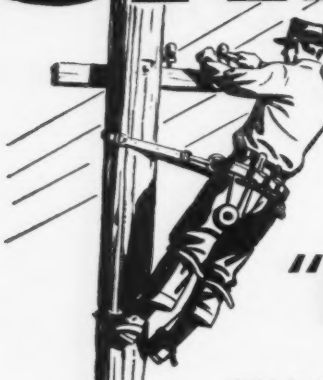
The design and ruggedness of Matthews Protectolink Cutouts and Protectolinks insures better performance and lower maintenance costs.

Because of the rigid construction of the contact arms they cannot be easily bent out of alignment when fusing or installing the cutout and the fact that the lower arm is actuated by an individual spring, assures positive contact tension on the Matthews Protectolink.

Note design of the contact ends of the arms. They provide easy installation and automatic seating of Protectolink buttons into the cup shaped contact recesses. No wedging of fuse link into contacts is required, thereby preventing damage to fine wires of fuse link cable. Matthews Protectolink Cutouts will also accommodate any make of open link fuse, and Matthews Protectolink Fuse Links fit other makes of open link cutouts.

W. N. MATTHEWS CORPORATION
SAINT LOUIS, U. S. A.
ENGINEERS and MANUFACTURERS SINCE 1899

SAFETY



FOR LINEMEN WITH "KLEIN-KORD"

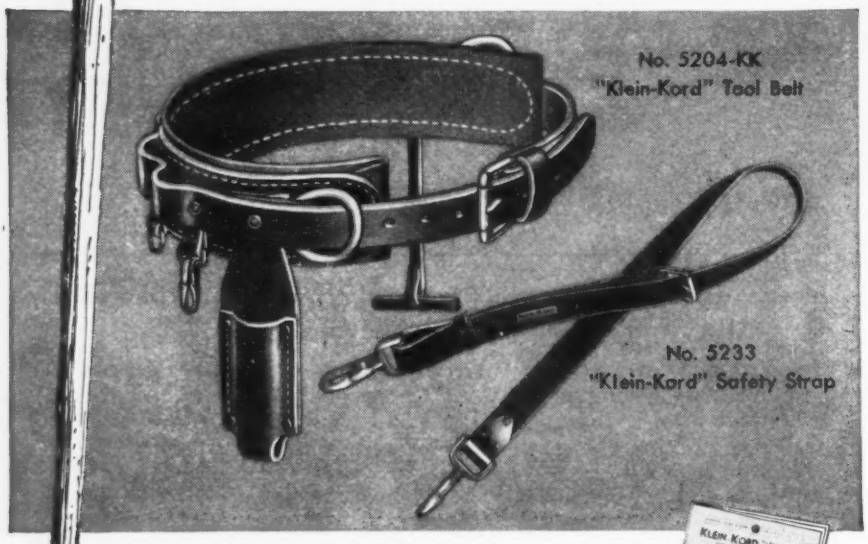
"Klein-Kord" is an exclusive material developed by Mathias Klein & Sons for use in linemen's safety straps, belts and climber straps.

It is made of a number of layers of long-staple cotton of special weave, each ply laid in rubber and vulcanized. This construction permits the use of a tongue buckle, eliminating the danger of slipping or excessive wear characteristic of a friction-type buckle.

The tensile strength of "Klein-Kord"—its resistance to ripping at the buckle—provides a full factor of safety. It does not stretch under load; is uniform in quality; and resists accidental damage from cuts, heat, etc.

"Klein-Kord" has behind it several years of actual service and today is specified exclusively by many of the largest utility companies.

Climbing equipment of "Klein-Kord" will assure the maximum in safety and comfort to the man on the pole.



ASK YOUR SUPPLIER

Foreign Distributor:

International Standard Electric Corp., New York

Safety engineers, purchasing agents and others interested in linemen's equipment can obtain a folder on "Klein-Kord" on request. Write for your copy.

KLEIN TOOLS EST. 1857

Since 1857

Mathias KLEIN & Sons

Established 1857 — Chicago, Ill., U.S.A.

3200 BELMONT AVENUE, CHICAGO 18, ILLINOIS

Slim F Lamp (328)

Sylvania Electric Products Inc. has announced that, as soon as conditions permit, it will supply a long slim fluorescent lamp in standard lengths up to 96 in. These LS types operate without starters and may be operated in series on a single ballast at 100 or 200 ma. or at other currents within this range to provide high lighting levels or lower intensities. Life of these lamps is expected to compare with that of 40-watt standard F lamps. Efficiency is said to be as high as 65 lumens per watt. They are equipped with single contact bases and are available in 3,500° white.

Type LS Lamp Size	Current Milliamperes	Approximate Lumens
42 in. T6	100	900
	200	1,400
64 in. T6	100	1,400
	200	2,150
72 in. T8	100	1,400
	200	2,350
96 in. T8	100	1,950
	200	3,300

The company also has announced a 13-watt miniature lamp in white or daylight, 21 in. long and ⅝ in. in diameter. Approximate initial lumens are 580 for the white and 490 for the daylight. This lamp is of the conventional two-prong starter type but will require a new ballast for its operation.

BULLETINS

data books, etc.

Insulation (329)

Mica Insulator Co. has prepared an 88-page illustrated manual on electrical insulating materials. Included are data, tables and values on sheet mica, built-up mica, laminated plastics, varnished cloth and tapes and other materials.

X-ray Diffraction (330)

North American Philips Co. has prepared a booklet on X-ray diffraction apparatus for identifying, comparing and analyzing materials. Applications are described and equipment is illustrated.

Kitchens (331)

Mullins Mfg. Corp. has issued a 24-page illustrated booklet on its Youngstown Kitchens. Included are pictures of the units and testimonials.

Brazing Contact (332)

Gibson Electric Co. has a new folder on silver-solder backed contacts for brazing. Illustrated.

Soldering Flux (333)

Superior No. 6 flux for silver soldering is described in a four-page folder issued by the Superior Flux Co.

Vibration Meters (334)

General Electric Co. is issuing a specification bulletin covering its vibration measuring equipment.

When Laytex-insulated wire first reached New Guinea, the natives were puzzled about its purpose. So were the inhabitants of other lands—from the Solomons to Mongolia.

For Laytex has gone into many, many regions where no wire had ever gone before. Under arctic cold, steaming tropic heat, the shattering shock of heavy explosions, Laytex performs better than was ever expected of any wire.

The entire output of Laytex Wires and Cables goes to fill the needs of war. But in a not-too-distant future the advantages of Laytex will be available for a long list of important home services... Buildings, Police and Fire Alarms, Communications, Signalling, Power, Control, and many more.

Rubber Insulation at Its Best

U.S. Laytex

ELECTRICAL WIRES AND CABLES

Serving Through Science

UNITED STATES RUBBER COMPANY

1230 SIXTH AVENUE, ROCKEFELLER CENTER, NEW YORK 20, N. Y. • *In Canada:* DOMINION RUBBER CO., LTD.

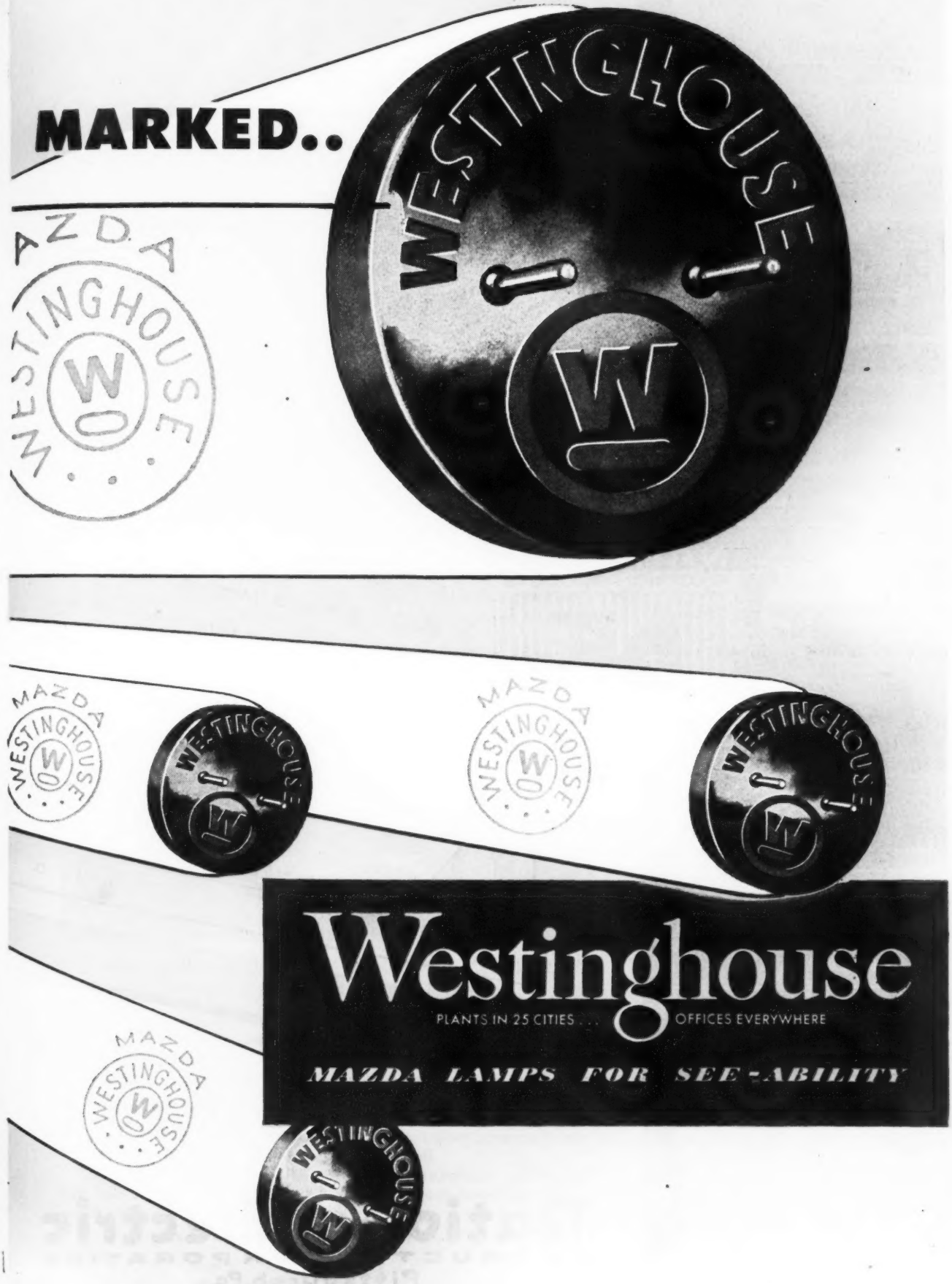
A LONG, BRIGHT FUTURE FOR EVERY LAMP

Every Westinghouse Fluorescent Lamp is a triumph of tireless research, skilled engineering and manufacturing know-how. Long life, unvarying efficiency and end-to-end brightness are literally built into every lamp carrying the famous Westinghouse trade mark.

Rigid control of raw products guarantees the utmost in quality material used. An example of this meticulous care can be demonstrated by the system of acid-washing, mixing and blending by which the phosphor powder is purified. Foreign matter is removed to a degree that not one part in a million remains to affect the light output.

This is matched by a precision of assembly technique which assures the uniformity of every Fluorescent Lamp Westinghouse makes. For instance, standards are so exact that no lamp varies more than 47/1000ths of an inch in length.

"Quality Control" means a long and useful life for every Westinghouse Fluorescent Lamp. And naturally means that you can recommend with complete confidence every lamp marked "Westinghouse." Westinghouse Electric & Manufacturing Co., Bloomfield, N. J.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PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE
MAZDA LAMPS FOR SEE-ABILITY

NATIONAL
ELECTRIC PRODUCTS
WIRING SYSTEMS
WIRES AND CABLES

In post-war building and remodeling, critical customers will look for electrical products of the highest quality and best performance. They will expect the promises of a great, new electrical age to be fulfilled. Contractors, their licensed craftsmen and electrical engineers who rely on the National Electric System of raceways, wires and cables will more than fulfill these expectations. And the user will find in National Electric products greater serviceability, longer life, and precise adaptability to specific requirements.

Conduits
Surface Raceways
Wires and Cables
for every purpose

National Electric
PRODUCTS CORPORATION
Pittsburgh, Pa.

Leader

industrial lighting service

A Step Ahead!

POSTWAR LIGHTING Now

LEADER ENGINEERS WERE ASKED TO COOPERATE ON A LIGHTING PROBLEM . . . . . .

A midwest manufacturer engaged in a terrific production program of Precision Parts for the war effort . . . and a contract to conduct a school for screw machine operators.

Intensified light source for each machine, required for machining precision parts was accomplished by continuous rows of 3 light 40 watt industrial fixtures spaced to concentrate light output.

A highly satisfactory layout contributing to better personnel relationship and increased production, is the result.

Leader engineers cooperating within the framework of straight line wholesaler distributor merchandising methods have made thousands of such installations all over the country.

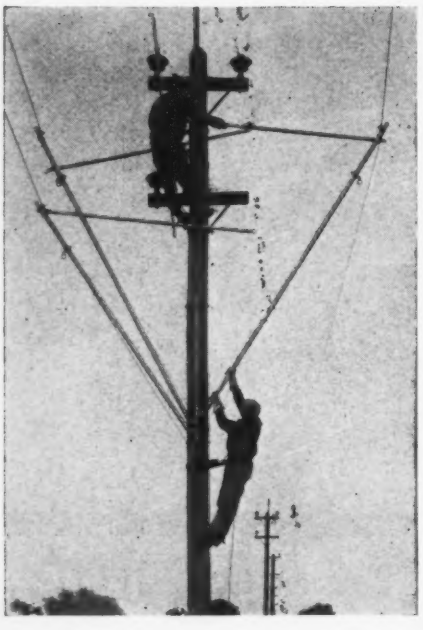
THERE IS A LEADER REPRESENTATIVE IN YOUR AREA

Distributed only through the better Electrical Wholesalers.

Leader Electric Manufacturing Corporation

2040 LIVINGSTONE ST. — OAKLAND 6, CALIFORNIA

Main Office and Factory, 6127 Broadway, Chicago 40, Ill.



SIMPLICITY
IS THE WATCHWORD IN DESIGNING ALL TIPS TOOLS

The engineers who design Tips Hot Line Tools figure that if the tools can be made simple as well as efficient in their construction and operation, they will also be safe. That, of course, is just plain horse sense, but it is also mighty important when it comes to making hot line tools. Complicated ideas are simplified in every way possible before the final designs are put into production. Check with the men who use Tips Tools for proof of their simplicity, safety, and dependability. Compare operation methods on any number of hot line repair jobs and you should be thoroughly convinced. You'll find, too, that there is practically no limit to the variety of repair jobs that can be handled in complete safety without service interruption.

When you get to the point of tool selection and ordering you'll find complete details on what to buy and how to use it in your Tips Tool Catalog.

CONSULT THIS BOOK

ABC INDUSTRIES

A·B·CHANCE CO. CENTRALIA MISSOURI

Varnishes (335)

In a 56-page booklet, John C. Dolph Co. tells the history and properties of insulating varnishes. This illustrated booklet gives data on selection, a reference table listing where its varnishes may be used, and detailed information on the various types, including air drying, baking and finishing varnishes, oil-proof enamel, special lacquers, shellac, synthite, etc.. The last 10 pages are devoted to thinning of insulating varnishes, insulating compounds, conversion tables, tank capacities.

Lighting Primer (336)

Mitchell Mfg. Co.'s Lighting Primer, originally published for its own employees, will be sent to business executives who request it, the company announced recently. The primer answers such questions as: What is a lighting fixture and why; defines lighting terms, lists spellings and tells how Mitchell fixtures are made and sold.

Range Units (337)

A new 12-page bulletin on Chromalox replacement range units has been released by the Edwin L. Wiegand Co.. It tells how to order and install the units and furnishes replacement data charts for every electric range in use. Available adaptor rings, ring elements and replacement parts are listed.

Kitchen Plans (338)

A kitchen planning booklet is being distributed by Nash-Kelvinator Corp. through retailers. Printed in color, this booklet gives general basic suggestions for kitchen planning, then illustrates different type homes with a floor plan and a kitchen for each.

Cables (339)

American Phenolic Corp. has prepared a new catalogue section describing 26 different types of RG cables and companion high-frequency connectors for ultra-high-frequency and electronic applications.

Resistor Color Code (340)

Stackpole Carbon Co. has prepared new vest-pocket resistor color code indicators to provide a quick means of identification. Included is information on resistor color coding under the American War Standard specifications and the joint Army-Navy specifications, both being identical with the RMA set-up.

Oil Breakers (341)

Pacific Electric Mfg. Corp. has issued new bulletins on its oil circuit breakers. One describes type RWE five-cycle trip breakers for 115, 138, 161, 230 kv. and higher. The other is on the company's line of 69-kv. breakers types RDE-42 and RDE-48. Both bulletins are illustrated by photographs and diagrams.

Fire Equipment (342)

A catalogue of its fire extinguishers and safety equipment has been published by the General Pacific Corp. It includes data on alarms and sirens, fire apparatus and allied products, as well as information on hose threads, nozzles and fire streams, maintenance, etc.

Wiring Devices (343)

Pass & Seymour Inc. has prepared new catalogue sheets on its wiring devices. Included are a wartime index and list price sheet and data on its new fluorescent lampholder, porcelain cablettes, switch and outlet boxes and switches for marine use.

Specialties (344)

Minerallac Electric Co. has released new literature and prices on its specialties, including steel cable hangers, conduit and messenger uses, steel clips and straps, porcelain insulating bushings and cable pulling and insulating compounds.

Tachometers (345)

Herman H. Sticht Co.'s model J triple range hand tachometers of centrifugal type are described in a new bulletin issued by the company.

Laboratory Heaters (346)

Precision Scientific Co. describes its new line of electric heaters for laboratory use in its Bulletin HP-1650 recently issued. These heaters are for 110-115 volts a-c or d-c.

ELECTRICAL WEST, 68 Post St., San Francisco, 4, California

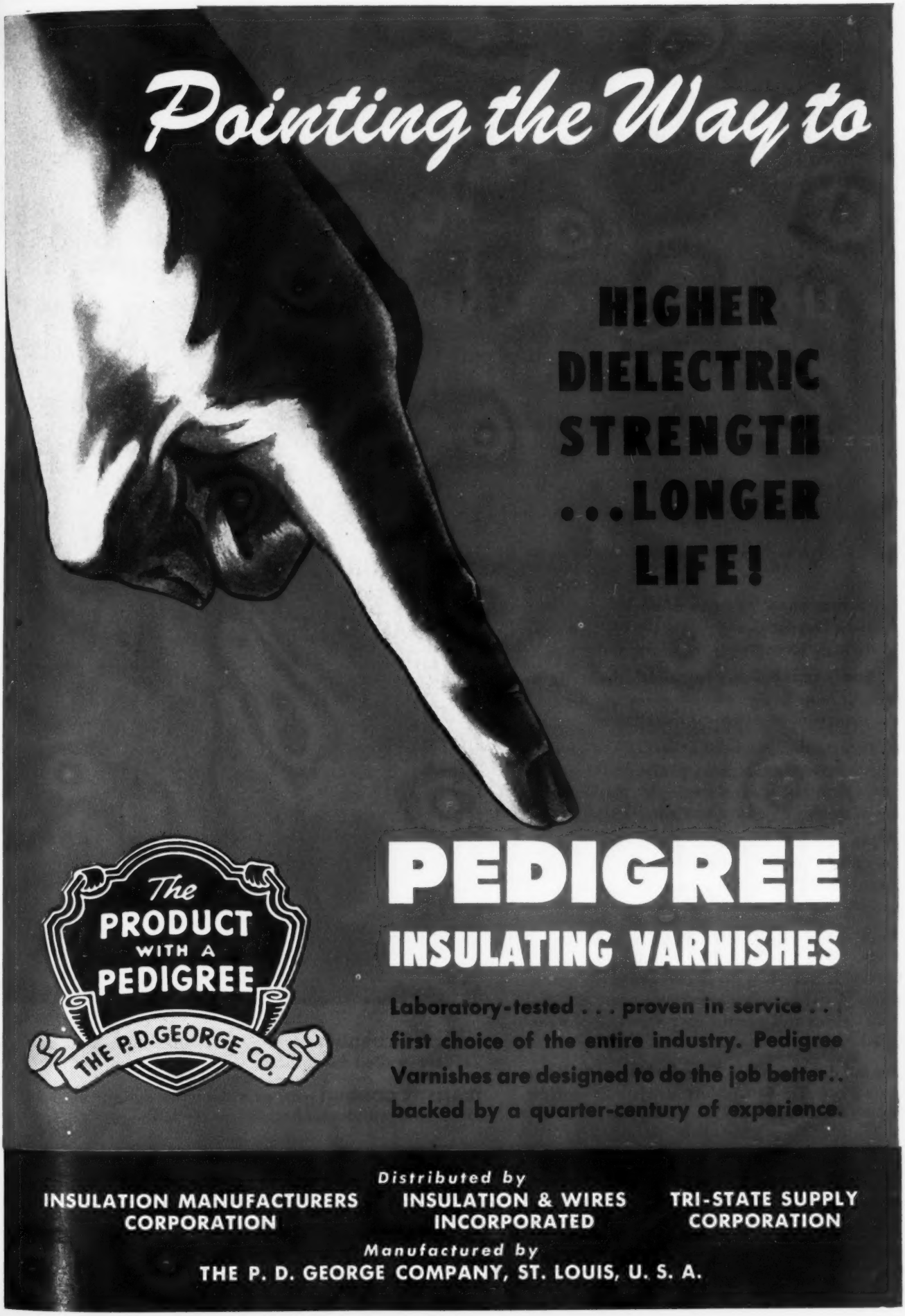
Please send me information about following CIRCLED items:

300	301	302	303	304	305	306	307	308	309	310
311	312	313	314	315	316	317	318	319	320	321
322	323	324	325	326	327	328	329	330	331	332
333	334	335	336	337	338	339	340	341	342	343
344	345	346								

Name..... Company*..... Title*.....

Address.....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.


Pointing the Way to
HIGHER DIELECTRIC STRENGTH ...LONGER LIFE!
The PRODUCT WITH A PEDIGREE
THE P.D.GEORGE CO.
PEDIGREE
INSULATING VARNISHES
Laboratory-tested . . . proven in service . . first choice of the entire industry. Pedigree Varnishes are designed to do the job better . . backed by a quarter-century of experience.
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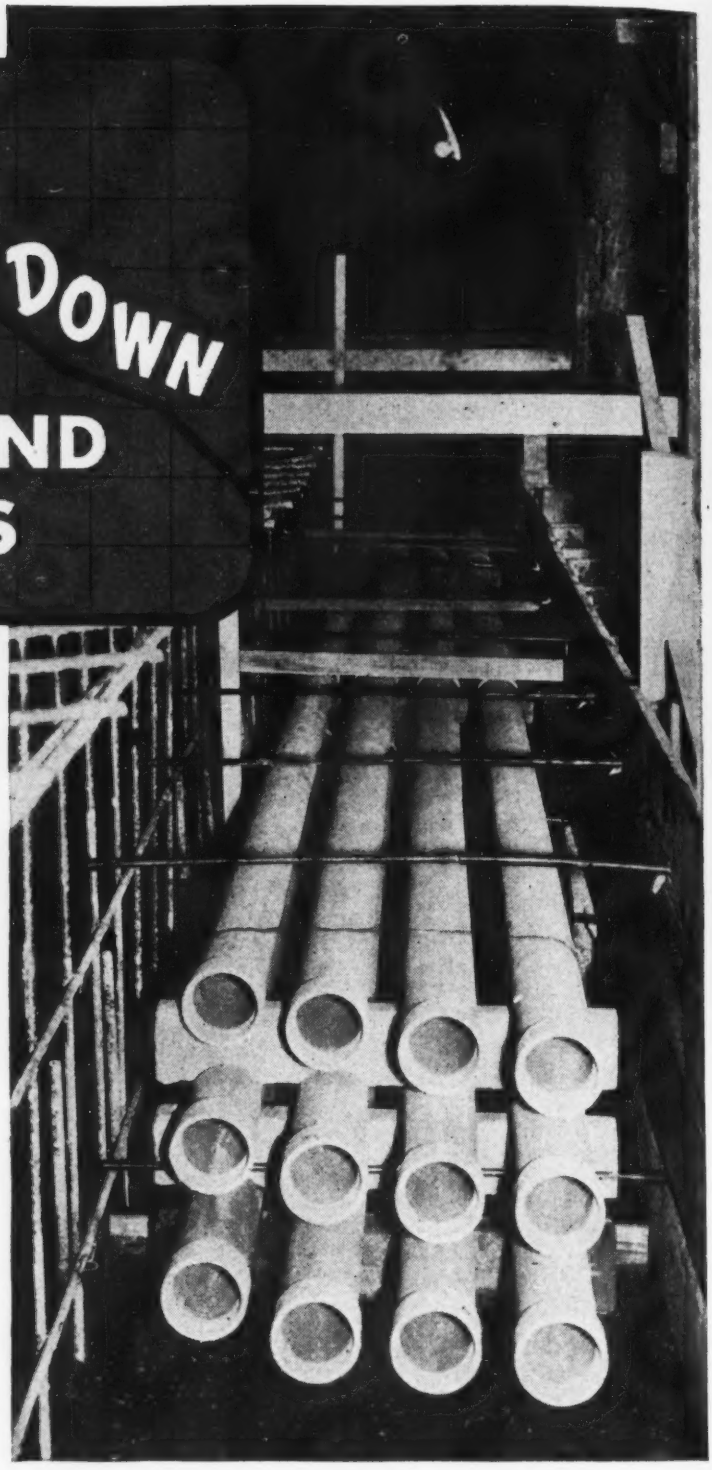
Manufactured by
THE P. D. GEORGE COMPANY, ST. LOUIS, U. S. A.

UPKEEP GOES DOWN with these UNDERGROUND CABLEWAYS



These 5 advantages of TRANSITE DUCTS assure low maintenance

1. *Permanently smooth bore*... long cable pulls and replacements are made easy. Danger of damage to cables is minimized.

2. *Easily and quickly installed*...long, lightweight lengths and simple assembly method assure rapid, economical installation.

3. *Inorganic*...made of asbestos and cement compressed under great pressure. This provides permanence and strength...makes these ducts immune to rust and rot.

4. *Immune to electrolysis*... being entirely inorganic and non-metallic, Johns-Manville Transite Ducts are not affected by electrolysis or galvanic action.

5. *Incombustible*... won't contribute to the formation of dangerous smoke, gases, or fumes. If burnouts do occur, these inorganic ducts provide maximum protection to adjacent cables and permit easy removal of damaged conductor.

For full details on J-M Transite Ducts, write for Data Book DS-410, Johns-Manville, 116 New Montgomery St., San Francisco, Cal.

TRANSITE KORDUCT *above*—for installation in concrete. Thinner-walled but otherwise identical with Conduit.

TRANSITE CONDUIT—for exposed work and for use underground without a concrete encasement.

Johns-Manville

TRANSITE DUCTS

JOHNS-MANVILLE JM PRODUCTS

Remember: Copperweld has the best electrical conductance of any high strength conductor—is 2 to 3 times stronger than hard-drawn copper wire—and has greater tensile strength than any wire of comparable electrical properties . . .

ONLY COPPERWELD COMBINES THE HIGH STRENGTH AND RUGGEDNESS OF STEEL WITH THE CONDUCTIVITY AND PERMANENCE OF COPPER

Copper molten-welded to a core *of high strength alloy steel*

Plan to use

Copperweld

ARMY NAVY

LONG-LIFE, LONG-SPAN WIRE

COPPERWELD STEEL COMPANY, GLASSPORT, PA.

Pacific Coast Representative: C. E. INGALLS · RIALTO BUILDING · SAN FRANCISCO, CALIFORNIA

As with our entire production facilities — now with our advertising — Railley's energies are single-mindedly devoted to America's war effort.

... but I'm plugging this Red Cross drive for all I'm worth!"

I'm getting used to civilian clothes again. But I've seen a lot of war, and the Red Cross was with me every foot of the way!

Like when I went to camp. There was trouble at home, but the Red Cross gal did a lot of writing and phoning, and first thing I knew, everything was okay.

And when I came out of the lines . . . fagged and wet and cold . . . it was a real life-saver to see a real American girl . . . and to soak up the homey, helpful services she was there to do for us.

Then, when I didn't duck quick enough and woke up in the hospital, there was the Red Cross again, making life bearable. In fact, they made life *possible,* because if it weren't for their blood plasma, I wouldn't be here today.

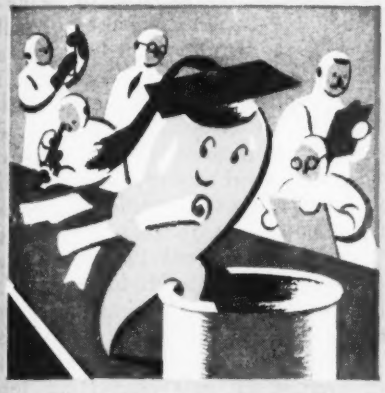
So long as the war goes on, the Red Cross is right in there pitching. You've got to hand it to them. And I hope you will — plenty — during this Red Cross War Fund Drive.

GIVE NOW! GIVE MORE! RED CROSS WAR FUND!

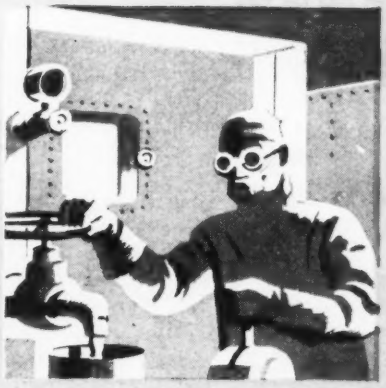
Railley
CORPORATION · CLEVELAND, OHIO
ORIGINATORS OF THE PIN-IT-UP LAMP

Now Making for Victory: X-RAY PARTS • GAS PROOF COVERS
ROCKET PROPULSION UNITS • DUMMY FUZES • PRACTICE CARTRIDGES

OPERATING INSURANCE FOR YOUR TRANSFORMERS

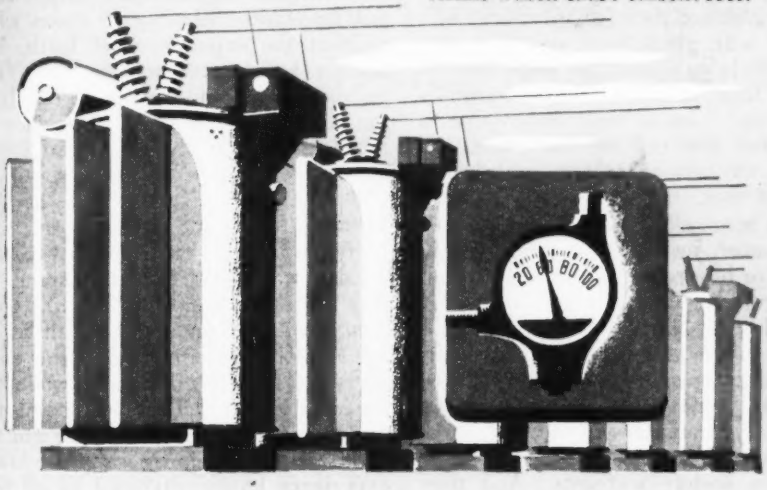


1 Prime factor in efficient transformer performance is the oil which both cools and helps insulate the unit.

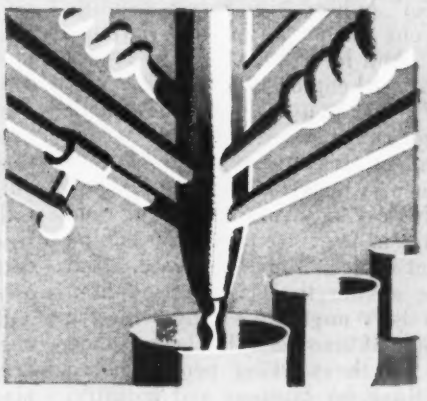


2 Extreme care has been taken in manufacturing Red Line Transformer Oil to exclude moisture and foreign materials which cause current loss.

3 In fact, the guaranteed dielectric strength of Red Line Transformer Oil, on delivery, is 27,500 volts—a pretty high fence for current to hurdle.



4 Red Line Transformer Oil's unusual stability assures steady, rapid dissipation of heat even when transformers are overloaded for long periods. And its insulating strength means current is always "locked in."



5 And, since Red Line Transformer Oil is carefully blended from the finest oil stocks, it can be used over and over.

Red Line Transformer Oil meets all manufacturer specifications and may be safely used wherever transformer oils are indicated. It is used by major power companies as well as smaller operators for extra operating insurance. For a supply of Red Line Transformer Oil, phone your local Union Oil representative.

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ELECTRA'S HUSBAND

A Union for Engineers

"YOU'VE heard that all of the engineers except the chief and his assistant at Pacship have had to join a white collar union haven't you?" I addressed our dinner guest one evening recently.

"I feel sorry for them and they will regret it," he said. You might infer from his answer that he was conservative in his viewpoint. He is. He's a highly successful practitioner, almost thirty years out of one of the topflight engineering colleges, and holds a position of authority and responsibility with one of the large local corporations. And he is a member of two of the national engineering societies.

"Why do you say that and what's wrong with unions?" Electra asked, sensing an opportunity to develop an argument, which she loves to do.

"My dear lady you don't know what you are in for if you start me talking on that subject," our guest said. "But let me answer the last question first. There isn't anything wrong with the principle of unionism. It's been a good thing for the working people and a good thing for business and industry. However, the perverted things that have been done in the name of unionism haven't been good for anyone, except perhaps the political bureaucrat who has capitalized on the strife and bitterness created by the rift between management and labor. There are good unions and bad unions and good union leaders and racketeers."

"My father belonged to one of the good unions for more than fifty years," I interrupted.

"But we were talking about engineers like you and me," our guest continued. "It's the continued inference that engineers must ally themselves with unions that I resent. It seems to me that two totally dissimilar and unrelated elements are being mixed when you attempt to elevate the economic status of the engineer by debasing his professional standing with a heavy dose of unionism. There must be other and better ways of accomplishing the same end."

"If there are, then a lot of engineers would like to know about them," I commented. "Otherwise they have no alternative but to join the CIO or the AF of L."

"For a long time society has protected itself," he continued, "against the practice of medicine and surgery by anyone who has not been certified as qualified to do so by a board from the profession itself whose rulings are backed by sharp laws. The same is true of the legal profession, the dentist and the nurse. Even the undertaker, the barber and the cosmetologist. . . ."

"He means beauty operator, in case you don't understand," Electra interrupted, directing her remark to me.

". . . before they can practice their trade," our guest went on, "have to prove their qualifications more meticulously than engineers. Any stumblebum—and a lot of them have come to my office—can call himself a sales engineer, an engineer of this or an engineer of that, including the good old quacky term, efficiency engineer, or for that matter, just plain 'engineer' without let or hindrance. He is debarred in California and some other states only from the title 'civil engineer.' Not until the engineering profession assumes a position on a level with that of law and medicine, can engineers expect the degree of recognition in tangible terms of remuneration and prestige that their place in society warrants. And they must be able legally to establish the same minimum requirements for qualification and have the same adequate powers for self policing."

"That's a fine theory," I said, "but it's almost impossible to achieve in actual practice. Such attempts have been made in some states with engineers' licensing laws."

"If the doctors and lawyers can organize, I don't see why you engineers can't," Electra said.

"Engineers can if they will," our guest said.

"You mean if they will agree upon a definition as to what constitutes an engineer," I said. "Not only that, but they must get a definition that will stand up in a court of law. Do you know how the civil engineers have defined an engineer in their proposed bargaining agency?"

"No," he said. "But whatever it is, my guess would be that it isn't good."

"Well judge for yourself," I answered. "I'll read it. A friend in the ASCE sent me a copy of their proposed rules and regulations. Hold your breath, here goes: 'The designation "professional engineering employee" used in the sense that persons capable of being so designated may join with others similarly capable of being so designated for the purposes of collective bargaining separately from any other group composed of persons not capable of being so designated, shall be that of only those who, excepting employers or those to whom employers have delegated managerial responsibility with respect to employment conditions, possessing an intimate knowledge of mathematics and the physical sciences, gained by technological and scientific education, training and experience, and in a position of trust and responsibility, apply their knowledge in controlling and converting forces and materials to use in structures, machines and products, and whose work requires the exercise of discretion and judgment, is creative and original and of such character that the output cannot be standardized; and those who, without the experience set forth, but having been graduated from an approved educational institution and having received the degree of Bachelor of Science, or its equivalent, in engineering, are engaged in engineering work'."

Our guest made a wry face.

"May the Lord save us," he said. "Any thoughtful engineer ought to look on that with the gravest misgiving. If that is the only kind of a step the technical societies can take to combat inroads of labor unions, then the engineers are sunk. And the arguments the societies use are fallacious. The plea is that they are doing it to protect and advance the incomes of those in the lower experience levels. Stripped of all pretense, the movement seems to me to be born of a fear that the societies will lose membership. My own feeling is that loss of membership, even to the point of extinction of any given technical society, would be preferable to identifying engineering practices as crafts. And that's exactly what will happen once the societies start promoting labor unions of their own no matter what name they give them. I don't think that economic advancement of engineers in any and every field can ever be attained by getting down on the same level with the CIO and the AF of L. It can only be accomplished by maintaining the very highest professional standards and seeing to it that only those who can qualify under those standards are allowed to assume the enviable title of 'engineer'."

Mr. Dealer . . . Let's take a look at Frigidaire's Wartime Advertising from your Customer's viewpoint

It helps me — that's the big thing about Frigidaire advertising. Homemakers have lots of problems now; we read ads that help solve them.

Frigidaire's wartime advertising helpful? Just look at these recent headlines: "How to Keep Meat" . . . "How to Cook a Meal in Your Refrigerator" . . . "How to Keep Your Refrigerator Happy". . .

Wouldn't you, Mr. Dealer, read such helpful ads if you were a homemaker harassed by wartime lack of foods, of time, of household help—perhaps worrying whether your refrigerator was going to last out the war?

You bet you would! And homemakers *are* looking to Frigidaire for help in easing wartime difficulties . . . for ways to help the war effort by conserving food and keeping their refrigerator running.

Wherever I look, I see Frigidaire ads.

Naturally! Helpful Frigidaire ads appear regularly in: *Good Housekeeping, Ladies' Home Journal, McCall's, Woman's Home Companion, American Home, Better Homes & Gardens, Sunset, Collier's, Life, The Saturday Evening Post, Time, Electricity on the Farm, Farm Journal, Holland's, Household, Pathfinder, Progressive Farmer, Successful Farming.*

Here's advertising coverage! A circulation of 37,704,000 for every message, reaching every type of community, every important age and income group.

In addition, practically all the home economists in the country—and through them, thousands of students and homemakers—helped with another series of Frigidaire ads in all leading Home Economics publications.

They're eye-catching. I always see Frigidaire ads.

Millions of magazine readers see Frigidaire's colorful, attractive ads. Independent research proves that Frigidaire ads are seen by more women and read by more women than any other home appliance advertising.

These Frigidaire booklets help me tremendously. I first read about them in Frigidaire ads.

Urgent and vital was the need for Frigidaire's two booklets on refrigerator care and use! More than 11,500,000 copies of "Wartime Suggestions" and "101 Refrigerator Helps" have been distributed, nearly 10,000,000 through Frigidaire Dealers.

In addition, more than 750,000 students and homemakers have seen the helpful motion picture, "How to Get the Most Out of Your Refrigerator."

How do I feel about Frigidaire? Well, I have confidence in this company. I'm familiar with it. Frigidaire ads have helped me. I know who my Frigidaire Dealer is; he gave me my free booklets. And I know that when home appliances are available again . . . *I'm going to see my Frigidaire Dealer first!*

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For Excellence in War Production

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Division of
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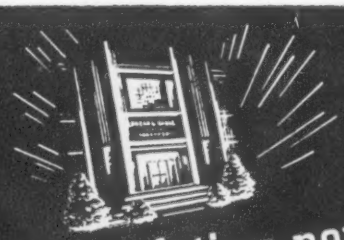
SEARCH IN

Here, the moisture-permeability of a synthetic is tested, over a time period, under conditions equivalent to years of difficult service... one of a multitude of separate explorations.

SYNTHETICS



Here, new and surer insulating performance is the goal of a great Research Laboratory.

How most effectively to use the new materials? Which synthetic polymer is best for insulation in dampness? How improve the vulcanization of butyl rubber? How get both high tensile strength and low temperature flexibility in Buna S? . . . In the General Cable Research Laboratory, most completely equipped and manned institution in the world devoted exclusively to wires and cables, a tireless group of scientists is seeking and finding the answers to a host of urgent, practical questions. The work being done opens new vistas of product serviceability in many fields.

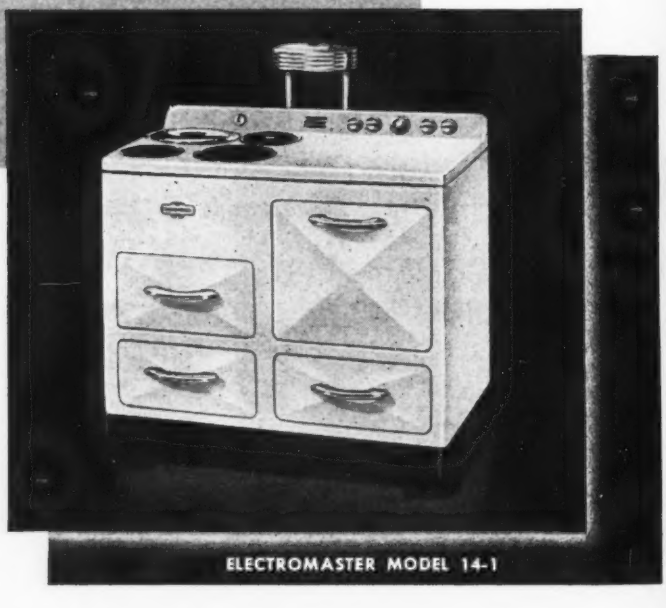
GENERAL CABLE CORPORATION

Manufacturers of Bare and Insulated Wires and Cables for Every Electrical Purpose

ELECTROMASTER

for 194X

Another "Electric Range for Tomorrow," drawn for Electromaster by George W. Walker, noted industrial designer.



ELECTROMASTER MODEL 14-1

What will the electric range of 194X be like? Will it feature numerous innovations and "gadgets"? Will it be conservative in design?

In any event, if it is an Electromaster product it will be tops for efficiency—engineered for maximum economy and trouble-free cooking. Like Electromaster Model 14-1, illustrated above, it will include such conveniences as easy-slide storage drawers, extra-deep twin unit oven, 6-quart Vita-Miser cooker, enclosed surface units.

Though busy in war production, Electromaster engineers are carefully planning tomorrow's electric cooking equipment. First emphasis is on safety, foolproof controls, maximum visibility of cooking operations, ease of cleaning. Such features as attractive appearance, cooking comfort, ease of operation and maintenance, continue to be prominent Electromaster selling points. Recent technical developments and new materials resulting from wartime research are helping to make Electromaster ranges the finest on the market.

Dealerships available in certain localities.

ARMY E NAVY

Electromaster

ELECTROMASTER, INC., 1807 EAST ATWATER ST., DETROIT 31, MICHIGAN

ELECTRICAL WEST

MARCH, 1945
VOL. 94 NO. 3

OUTLOOK FOR THE ENGINEER

America's destiny rests upon the application of the realistic and sound mental processes of engineering; an appeal for greater breadth of view in facing the opportunities and problems growing out of the war

*F. T. Letchfield**

Consulting Engineer, Wells Fargo Bank & Union Trust Co.
San Francisco

I HAVE a growing conviction that the engineer has become a critically important member of society. To fulfill that role properly, however, his breadth of view must run beyond the mere technical boundaries of his profession. His greatest contribution may well lie in the application of the sound mental processes requisite to successful engineering to many problems bedeviling the world and upon which there is so much intellectual confusion among the masses and so much muddled thinking in high places. That may sound like an extravagant statement—unwarranted by the facts—but let us briefly appraise our present circumstances and examine their background.

Today, all over the world, Americans are dying to preserve the American way of life, to insure its perpetuity. It is not an easy way, it's a hard way—but it is the best way, as more than a hundred and sixty years of glorious history have proven. It is a *modus vivendi* which enabled seven per cent of the world's population to create, and own, over half the world's wealth; to attain standards of living so high that by 1929 we consumed 75% of the world's silk, 70% of the world's petroleum and rubber, and over half of the raw materials of the world. It enabled us to spend more money on education and have more children in school than all the rest of the world put together.

We had a virtual monopoly on automobiles, bath tubs, telephones, electrified homes and the other luxuries of life. In 150 years we had succeeded in creating three times more wealth than all the world had created in all its history up to 1776 and America was a magnet attracting all those who were allowed to seek citizenship here. Those magnificent accomplishments were the collective result of individual enterprise under a system which granted to the individual the fruits of his own labor but which also held him responsible for his own mistakes.

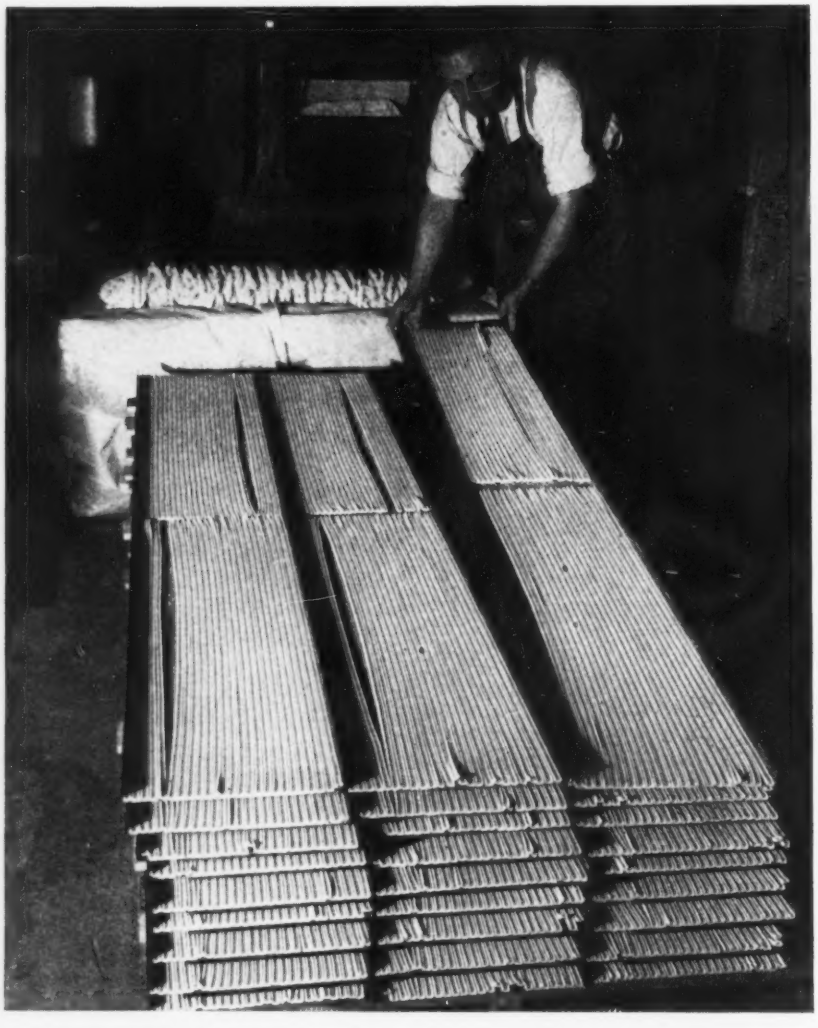
That system of free enterprise had its birth in the same cradle which bore the Declaration of Independence, the Constitution and the Bill of Rights. Our great business and industrial structures were fashioned by the same human desires, the same promise of adventure, the same hope of profit and a better living for succeeding generations. Indeed what was said of the "Forty-Niners" could apply to those who have built and expanded our economic mechanisms to their present magnificence. "The timid never started, the weaklings died on the way." Americans are intelligent, tough and resourceful. They have had to be to create from a wilderness the most powerful nation on earth.

As engineers we have to be realists. We had better start being realists in respect to our other responsibilities as citizens also, for, if we are to secure domestic and international peace, it will be necessary for America to gets its economic structure back on a sound footing—a foundation which it has not had for more than twelve years. Let us not forget that our refusal to assume the international *noblesse oblige* bequeathed us by the last war, and our failure to solve our own economic problems, were the underlying causes of the present war. If we fail this time in either field of political and economic statesmanship, there can only be world chaos.

There is a school of thought which casts the engineering profession as the villain of our economic drama. It holds that engineers have increased the quantity and variety of material things far beyond our ability to distribute them equitably and that the result is economic and social indigestion. While the pace of engineering advancement has undoubtedly complicated many of society's problems, those who decry our accomplishments should offer prayers of thanksgiving that the grim necessities of war have vastly extended our abilities in all fields of production for therein lies the key to an affirmative answer, potentially at least, to the question of how we are to solve the task which war will leave us for we shall have to produce on a scale undreamed of three short years ago. The dimensions of that task can be given in rather simple terms.

First, we will have to restore those conditions which will permit private enterprise to produce a sufficient amount of wealth which, if intelligently administered, will enable us to start liquidating the public debt this war will leave us. That is the job. The thesis that we must provide work for 60 million people and attain a national income of such and such a number of billion dollars not only puts the cart before the horse, but begets many other misconceptions of the true task. Solvency is maintained by producing more than is consumed. There is no other way—and that applies to an individual, a business or a nation. If we can accomplish that here in America, we need not concern ourselves with unemployment or even the dollar figure of national income. In fact I wish that

* Extracts from an address before the San Francisco Engineering Council, the annual joint meeting of engineering societies, Jan. 25, 1945.



Silicones—polymers consisting of chainlike molecules each containing a silicon and oxygen atom—hold forth untold promise in a variety of engineering applications. Silicones have been produced with characteristics of resins, oils, insulations, water repellents and rubbers. Many of the uses are still wartime secrets. Silicone rubber, for instance, retains its elastic properties at temperatures ranging from —60 to 575° F. Natural rubber smashes like glass at that low temperature and melts and burns at the higher. Here silicone rubber gaskets are being made for General Electric B-29 turbo-superchargers.

the latter might be given in terms of tons, bales, barrels, bushels, pounds and pieces, instead of dollars, for it might serve to dispel the illusion that money is wealth; it would expose the fallacy of a scarcity economy, help to demonstrate to labor unions that featherbedding rules only impoverish its members. Such a concept might even convince many business executives that labor, whether mental or physical, is not an expense but the only real earning asset at management's disposal.

Production requires, first of all, capital which will accept a risk in the hope, and with the expectation, that it will earn a return commensurate with that risk. Secondly, there must be capable, experienced management, there must be efficient, enthusiastic labor and there must be freedom from undue restraints either by government or wrongful business combinations. These requisites are fundamental to practically all activities seeking profit, including most categories of service, but in industry they are not of themselves sufficient for there must also be engineering know-how, and the latter in turn must be based, in a large measure, upon science. The reason for this is quite obvious if one but remembers that human knowledge grows geometrically and that, under the forced draft of modern mechanized warfare, both science and engineering have advanced at a pace far beyond all previous experience.

While the story is not new, perhaps it would be well, briefly, to recapitulate some of the causes and effects of the tremendous acceleration in all technical fields to the end that we may better appraise their peacetime significance.

The major stimulus, I believe, to the remarkable advances in science is to be found in the battle geography of this war. Our forces have had to fight in the incredibly cold Aleutians, on islands lying on the equator, from the hot, arid deserts of North Africa to the steaming, semi-daylighted jungles of the South Pacific. Men are fighting on land, a hundred fathoms beneath the sea and forty thousand feet above it. In an hour's time the skin temperatures of an airplane may vary from 140° F above zero to 65° F below. On any day some new weapon or mechanism of defense used by the enemy may make our own devices or tactics quite obsolete. Such are the conditions imposed by modern warfare, but they have brought about a most complete and effective mobilization of our scientific resources — both human and physical.

The major stimulus to our advances in engineering is to be found in a few short hours of history. On Sunday, December 7, 1941, our "Defense Effort" was transmuted to a grim struggle for survival as an active belligerent. Only historians, half a century hence, can appraise the valiance with which that challenge was met; but this much we know—in less than three years we constructed the world's most powerful navy, armed eleven million of our own men, and as many more of our Allies, with the finest weapons and accouterment of war ever produced, created a merchant marine to move troops and their materiel over the seven seas and have had enough left over to feed millions in foreign lands who otherwise would have starved.

No greater tribute could have been paid the genius of American scientists, engineers and our industrial leaders than the aplomb with which both the Army and Navy wrote ideal specifications for each device and mechanism of warfare they needed. Not once was compromise made with expediency. Not once, so far as I know, have American brains failed to achieve that which was asked of them. Truly, America might take as its national motto: "The difficult we do immediately, the impossible takes a little longer."

Why it is that out of war, when all of men's efforts are bent upon more complete and speedier destruction of his fellow men, come whole new families of things and methods whereby to lengthen life, make it safer and generally more comfortable, is a paradox to which only the Great Master can give the answer. But certain it is that the trees of war we have planted these

past four years will bear many new and wonderful fruits of peace, if we but have the wit and courage to foster their growth and harvest them wisely.

What the first world war did for aeronautics, this war has done for electronics until now it represents the most important body of technical knowledge man has acquired since Newton deduced the laws of gravity and dynamics three hundred years ago. That, too, may sound like an extravagant statement. But just consider for a moment how far electronics has extended our senses of sight and touch. Reflect for a moment upon the implications of radar, the electronic microscope, the electronic strain gauge, piezo crystals, induction heating, the iconoscope and the infinite possibilities lying within the ultra high frequency spectrum. Remember above all that henceforth any signal, any impulse, however minute, can be amplified to any desired magnitude.

While electronics may be the *sine qua non* of technical developments, it is by no means the only prodigy born of this war. Besides the physicist, the chemist, the physio-chemist, the metallurgist and the engineer in every branch of the profession, have all made contributions of incalculable worth. To enumerate even a tithe of their accomplishments would be quite impossible, but one may mention as typical the perfection of the turbo-supercharger which may well cause the gas turbine to become the most important of all prime movers.

Glass fibre, the first from inorganic substances, has a tensile strength as high as 350,000 lb. per sq. in. Laminated with proper plastics, it has a higher strength weight ratio than any metal. As an acoustical or thermal material, it is apparently without a peer, especially on a weight basis. As an armor plate, laminated glass fibres have startling possibilities and it may become the choice material for draperies and upholstering. In one form this new material makes a superior mattress or seat cushion and it may yet form the body and complete chassis of the future automobile. Nor have I begun to exhaust its potential uses.

It seems only yesterday that silicones first appeared as substances of practical every day use. They are still an esoteric product yet they excite the imagination as much as glass fibres. Already they have provided a lubricant with a flat viscosity curve from 65° below zero to 400° above. So great is their versatility that they prevent the shrinkage of textiles and impart high elasticity and many other valuable characteristics to a long list of products.

But to return to the main subject, anent the job we will face the day war ends. In concrete terms it will probably look something like the following.

Fiberglas is certain to become one of the basic materials in post-war engineering and production. Made from minute fibres or filaments, Fiberglas can be fabricated into resilient, wool-like bats or rigid sawable boards, or it can be woven on a loom like silk, cotton and wool. The war has widened the horizons of its uses. As insulating board it is used as protection against heat and sound in ships and planes; as tape it filters blood plasma and insulates wires and cables; mats of Fiberglas give added life to submarine storage batteries. Some 300 research projects on its use are temporarily shelved due to the war.

We are currently producing at the rate of 150 billion dollars worth of goods and services a year, of which amount about 65 billions apply directly to the war effort. The Committee for Economic Development, the Brookings Institute and other thoughtful agencies generally agree that we shall have to maintain our peacetime production at substantially the present war level. In other words, at a rate nearly twice as great as in 1929. This leaves the question—will our peacetime economy absorb 85 billion more goods and services than we are now using? The answer to that, potentially at least, is, I believe, relatively simple and in the affirmative.

Let me again point out that we have not yet recovered from the depression. Since 1929 we have been accumulating physical deficits—the things we need to rehabilitate our homes, our farms and our factories—at an accelerating rate. Their volume would long ago have brought us boom times had political forces not interfered. Just what the dimensions of our domestic needs are, no one may say, but I am sure that could they be measured we would find the stockpile of work to be done even greater than our war effort—colossal as the latter may be. One has only to consider a few factors to sense its hugeness.

Of the 29 million automobiles we own, 7 million have gone to the scrap heap and 5,000 more join them every day. Of the 22 million cars we are op-

This war has given the same stimulus to electronics as the last one did to aviation and radio. Much postwar engineering progress will be based upon wartime electronic discoveries and developments. For instance, the electron miscroscope, heretofore the tool of the physicist and biologist, will be a common tool in industry. Magnifications of the order of 25,000 to 100,000 diameters can be obtained with this device. Here is a portable electron microscope developed by General Electric weighing but 78 lb. and fitting into a suitcase.

erating, 15 million are at least seven years old, and a fifth of that number were made prior to 1932. This means that the automotive industry could make six million cars for the next five years and then it would be five years behind. The same general considerations apply to homes, farm machinery, rolling stock and whole categories of capital goods. Everyone is familiar with the dearth in other items from nylon stockings and garden hose to washing machines and electric toasters. Nor do these factors include the more or less universal obsolescence which scientific discoveries and engineering developments have brought to practically everything we use. On top of all this is the expanded use which greater perfection will introduce in many directions —the gas turbine and its application to the airplane, as an example.

Granting that we can, under favorable conditions, maintain the national income at present levels, will such an accomplishment get us back to the black ink side of the ledger?

We emerged from World War I with a national debt of 26 billion dollars. We paid off ten billion of that in the ensuing nine years on a declining tax rate. It is expected that this war will leave us with a debt of at least 300 billion. Certainly we cannot annually produce ten times more than we did in 1929, but we can stand tax rates much stiffer than any we knew in the twenties.

In 1943 we collected 43 billion in taxes and I understand they rose to nearly 45 billion in 1944. Either figure represents a load far too heavy for individuals and business to carry year after year. But we could, if necessary, support a tax burden of 25 or 30 billion dollars—if not with comfort, at least without danger. In conservative circles of government, it is felt that a maximum budget of 20 billion dollars would service the public debt, provide for adequate military and naval forces, permit generous pensions and still leave enough for general requirements. If so, a tax levy of 25 to 30 billion dollars would liquidate the cost of war in thirty to sixty years which is no time at all as such matters run. In short, our national solvency can only be endangered by the crassest kind of blundering.

In closing I want to talk about the engineer and why I believe he holds a special and valuable franchise in society.

To me, engineering is something more than a professional activity which seeks to convert the discoveries of science into things of practical, everyday usefulness. I regard engineering primarily and essentially as a rational mental process, a logical method of dealing with the facts of life. It requires intellectual honesty, yet it places a premium on imagination, and its greatest accomplishments are born of adversity. I am not suggesting that engineers have a monopoly on intellectual virtues or that we are an intellectual lump which shall leaven the whole loaf. I am proposing no crusades or mass actions, for each of us makes his greatest contribution to society by sticking to his own job and doing it as well as he knows how. I am endeavoring, however, to point out that the mental discipline which the engineer must exert in the practice of his profession, his appetite for facts and his enforced obedience to truth are exactly the qualities most needed by the sorely troubled world in which we find ourselves today. The demand for those qualities will increase rapidly, for here in America the end of the war will bring a day of reckoning, a day of disillusionment when there will be a cry for those who can think accurately and will act honestly.

Earlier I mentioned that great wars are always followed by reactions. This one will be no exception for the day peace comes there will be a snapping of tensions, a longing to get away from every condition that obtained during war. People will want to drive into a service station and say, "Fill 'er up." They will want to go into a grocery store and buy five pounds of butter without counting ration points. They will want to travel without let or hindrance, and the fact that they may not be able to do any of these things for some time after the shooting stops will only whet their desires and steel their determination to recapture the more normal life they once knew. More important, however, they will regard this war as the product of dictators and inevitably they will take steps to prevent dictatorships. They will not again allow a single man, or small groups of men, to wield great powers. They will again recognize the individual as the most important element of society, they will again value his inalienable rights, they will restore his sovereignty. And these things will happen here in America, regardless of what the political or the economic surfaces may show the day peace comes, for human behaviorism, though cyclical, is peculiarly consistent. If you doubt this, read history.

The war is disillusioning the American people in respect to many false ideas they have accepted on faith for the past several years. By the time the bill for the war is presented, the process of disillusionment will have been completed. They will turn then, nostalgically to the traditional American system of free enterprise for they will realize that it is the only sure and proven road to a better life. As engineers, you and I know that given the proper environment in which to function, that what we have accomplished under the forced draft of war is only a start toward the wealth that we can produce in times of peace. That our standards of living need be limited only by our collective stupidity and laziness. But Americans are neither stupid nor lazy —nor have they lost faith in the high destinies of America.

Trends in Postwar Truck Body Designs

Experience with truck bodies of aluminum, common sheet steel and low-alloy, high-strength steels inclines utility truck body design engineer to favor latter materials for over-all results

Fred S. Beach

Northwestern Electric Co.
Mechanical Engineer

WITH deferred maintenance confronting power companies as an immediate postwar job of sizable proportions, those with the utilities who are charged with design of truck bodies and accessory equipment are reviewing their past experience critically with a view to what new designs and materials may be employed. Irrespective of individual preferences as to bins, lockers and those features that appeal to the line department, the most important consideration of the body design engineer is the type of metal to be used.

No one can say at this time what the postwar period will have to offer in the way of new alloys but, based upon some knowledge of war developments in metallurgy and with many years of experience with various metals to draw upon, the writer is inclined at the moment to look with favor upon the low-alloy, high-strength steels. To develop this line of reasoning, it is necessary to go back to the first all metal bodies built in 1930 by Northwestern Electric Co.

At that time two bodies were built. One was fabricated from mild sheet steel and arc welded; the other was of composite construction using high-strength aluminum alloy with riveted joints. In the latter, the floor, bins and bin doors were of spruce bolted in place in the high-strength aluminum frame. This material is popularly known as "Duralumin" and shortened to "Dural". Since "Duralumin" is a copyrighted name and the copyright thereon is not owned by the Aluminum Co. of America, they do not encourage the use of this name for their products. These two bodies, shown in accompanying photographs, proved entirely satisfactory and are still serviceable, although the aluminum body is out of use at present because of inability to replace a worn out chassis.

With aluminum structural shapes and sheet gussets, the method of construction now requires riveting the various members, a process that entails considerably more time than for the layout and cutting for an arc welded steel body. Moreover, in a riveted body structure, the sheets must be lapped, whereas in a welded body the excess material required for lapped joints is unnecessary. From the standpoint of durability however, this body is substantially as rugged as when new 14 years ago and has shown no material deterioration.

Metallurgists may develop a high-strength aluminum which can be arc welded and brake formed with equal facility to steel by arc welding without weakening the parts that will overcome any objections here inferred. If this is accomplished and the unit cost of the material is reduced to make a given body comparable to the cost of similar body of high-strength steel, then aluminum will be a logical material for body construction because of its very

Above: High-strength aluminum body built in 1930 shows no appreciable deterioration, but is out of service at present due to inability to obtain chassis replacement. Service weight of body is only 880 lb. Chassis is Ford AA

Below: First mild steel body built in 1930 is still in service. Joints were welded and structural members brake formed. Weight is 1,660 lb., or 625 lb. less than previous composite bodies

In 1938 this body of "Cor-Ten," low-alloy, high-strength sheet steel was built. Members were brake formed with all joints welded. Weight of unit empty is 9,060 lb., and body weighs 1,958 lb. A feature of this heavy-duty line truck is cab for workmen which may be seen directly back of drivers cab. Truck carries its own gin pole

desirable weight and other features.

High-strength Steels

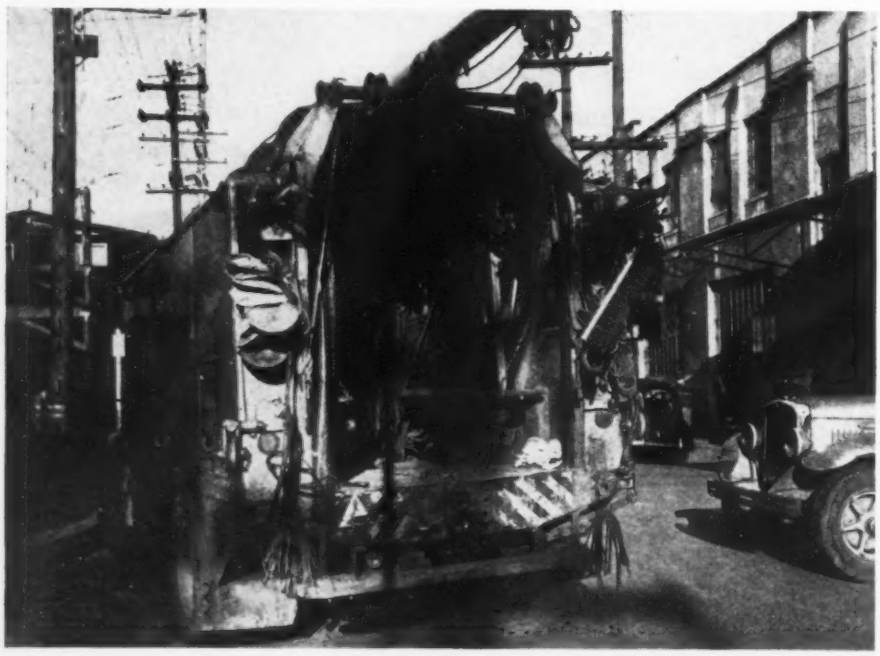
In 1938 two bodies of the same design were developed, both being fabricated from high-strength, low-alloy sheet steel called "Cor-Ten," product of the United States Steel Corp. All joints between the numerous members of this construction were arc welded, and while the sheets were considerably thinner throughout due to the high yield point of the material used, the construction was similar to the steel body built in 1930, which was made of common mild steel, also welded.

There are three principal varieties of this type of high-strength steel. Besides the one mentioned, there is Mayari-R, a product of Bethlehem Steel Co., and Yoloy, made by the Youngstown Sheet and Tube Co. All are similar as to corrosion resistant properties, and have an ultimate strength of 70,000 lb. per sq. in., or better, and a yield strength of 50,000 p.s.i., making it possible to use working stresses of 20,000 p.s.i. They are nearly as readily brake formed as the softer mild steels and can be electrically welded either by the arc, spot or shot weld methods without loss of strength in or near the welds.

The thinner gauges permitted by these high-strength steels save about 1/3 the weight resulting from use of common mild sheet steel. This weight difference is strikingly shown by comparing the high-strength bodies described with a later body built of mild steel in 1941. The "Cor-Ten" bodies weighed 1,958 lb. net, while the mild steel body weighed 3,000 lb., plus. Both designs were comparable as to general features of size and capacity.

In an all-metal body, corrosion is one factor that determines its relative durability. At present the Aluminum Co. of America produces two types of high-strength aluminum. One known as "Alclad" is plated with pure aluminum which resists corrosion even in salt air and requires no painting. It costs slightly more than the other type which requires the same preparation and painting as with steel. The high-strength, low-alloy steels have a corrosion rate only about 25% that of the mild steels, but nevertheless require painting.

These experiences with high-strength aluminum alloys, mild steel and high-strength, low-alloy steel, show that, if cost and weight are both to be saved, then the high-strength steel sheet, fabricated with brake formed parts electrically welded, gives the better overall results.



All-purpose line truck body of mild steel built in 1941. Members were brake formed and joints welded. Weight of body is 3,000 lb. and empty weight of the unit is 10,000 lb.

New Magnesium Finish

An electrically created permanent finish for the world's lightest metal—magnesium—which is impervious to corrosion and abrasion has been developed in the research department of Consolidated Vultee Aircraft Corp. According to N. H. Simpsonn, chief chemist, and Paul R. Cutter, research chemist, the treatment which produces the finish is simple but effective.

After degreasing and removal of a film coating magnesium parts are connected to either an alternating- or direct-current circuit, after which they are rinsed. The finishes are known as C.V.A.C. No. 1 a-c, and C.V.A.C. No. 1 d-c, depending on which current is used. Tests show that the finish, after two coats of paint, is more corrosion proof than others after four coats. Resistance to abrasion is 100 times greater. The finish can be obtained in any color. The entire development is a result of war-production inspired research in connection with aircraft finishes.

Realism In Electric House Heating

Plan to sell 100,000 kw. for house heating in Northwest causes serving agencies of Bonneville power to view realistically the program as a whole. Only compensatory rates will prevent later dumping of load

PROPOSAL to launch an extensive postwar house heating program in the Pacific Northwest to market a part of the 900,000 odd kilowatts of war-industry-released power is causing serving agencies of that area to scrutinize carefully the many factors that enter into serving this type of residential load. The Bonneville Power Administration, in a recent article in *Fortune* indicated that it expects this house heating load to develop to 100,000 kw. during the first five years following the war.

Such an ambitious program for a type of residential load about which not too much is known, quite naturally is causing all agencies that distribute Bonneville power, or upon whom there may develop public demand for house heating service, to view critically the many factors involved. Some idea of the magnitude of the problem may be had from the fact that a 25% saturation of house heating on the average Northwest utility system would produce a 24-hour continuous heating load, on a cold day, about equal to its present peak. Utilities, public and private, have become interested in a correct engineering and economic analysis of this problem and are giving active study to it. A fundamental consideration to the utilities, if this program is to be developed, is that it be done on a basis that will develop this class of business permanently without the necessity of later increasing or withdrawing rates for this service, as has happened in some instances in the past in this territory.

Generating Cost Important

Those who have grown up with the utility business in the Northwest territory from the old days of purely lighting load to the present high saturation of range and water heater loads, have made a very interesting observation. When residential load was mainly lighting, distribution cost was the all-important element in the rate, with the cost of generation being relatively unimportant. What is the situation with the present-day large range and water heater loads? Here the cost of distribution enters into rates to far less extent, and generating costs have become increasingly important. When the electric house heating load is analyzed, what is the situation? In this case conditions are completely reversed from the original purely lighting load, and distribution costs become of relatively low importance, with the cost of generation being the all-important element in the rate. Obviously, this condition is the result of the relative size of the loads. A fallacy has existed in the minds of some that, because house heating is a residential load, it is therefore small. The fact is that house heating load with any appreciable saturation quickly becomes the controlling factor in the size and shape of the utility's load curve.

This brings another interesting and important problem to light which reverses the usual thinking on residential loads. Residential loads have been almost universally supplied on a straight kilowatt-hour rate, primarily for the reason that the utility could not afford the luxury of demand metering. With house heating load, on the other hand, the cost of demand metering is relatively unimportant in the annual bill, but proper control of demand is of vital importance in keeping down the costs of supplying this type of load. Demand metering will therefore likely be used.

What Approach?

What then must be the approach to the problem to find a sound answer? A little thought makes it clear that the place to start is with the customer's meter and not the power house generator. At what rate will electric house heating load be attracted in volume? The figure most often cited is 7 to 8 mills per kwh. It would appear that this is about all the service will stand when one considers that the cost of coal with modern stoker-fired installation compares approximately with 4-mill kwh. electricity, and that automatic oil burners and other methods of heating fall in about the same cost range.

It is axiomatic in the power business that, where the cost of power is not subsidized, the characteristics of the load served must be such that the rate charged for that service will be compensatory. Public utility districts, municipals and private power agencies of the Northwest say that with the present application of the Bonneville schedule, the net rate they can earn for firm power requirements is between 3 and 5 mills. If house heating load is then added, the incremental cost for any sizable block of this load will be of the order of one cent per kwh. Thus obviously, a 7- or 8-mill rate for house heating will not even cover the cost of the energy supplied, to say nothing of the other costs involved, and is certainly far from being compensatory. Manager Harry Kelsey of the Cowlitz County Public Utility District where Bonneville is gathering data on some one hundred house heating jobs, reportedly stated last July that the burden of house heating on distribution lines in Longview was not serious because of diversity, but that the kilowatt-year rate for power supply was not the right rate. At the $17.50 per kilowatt-year Bonneville rate, power for a 6-kw. house heating load costs $105, whereas the average revenue from such installations is only $60.

The implication is that if this house heating load is to be developed, Bonneville, which has assumed the obligation of supplying additional load in this area, and which itself does not serve directly to any residential customers, will have to make a special rate to retailing agencies for the energy so used. If Bonneville cannot do this and "bail out" its investment, then electric house heating will be an expensive luxury—available only to a very few of the well-to-do who are not concerned with the cost. This ties right back to the statement earlier made, that the cost of power is the most important consideration in serving electric house heating.

These are some of the basic factors that must be settled before any general agreement can be reached on the desirability of going along on this house heating program. They are problems, however, that are capable of solution through a meeting of minds of the parties concerned, and such a movement is now under way.

In a subsequent article, the various proposed systems of developing and applying electric heat to residences will be discussed, and some information given on their load characteristics and their practicability.

Coil winding machine (background) is used to draw wire through dies. The grooved idler wheel permits making two draws in one operation. "V" trough contains tallow. In foreground is an electric butt welder for splicing wire. Square box at extreme left contains wire wool for thoroughly cleaning wire

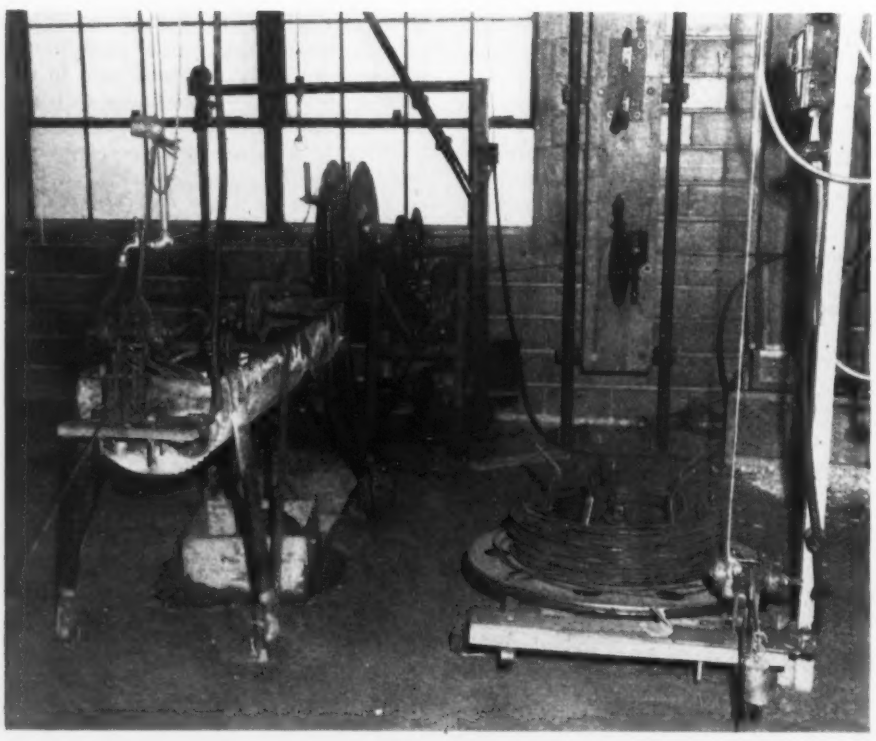
A Wartime Wire Salvaging Program

No purchaser for large quantity of old No. 2 wire being found, power company aids the war effort by inaugurating wire drawing program to produce usable sizes. Fill-in warehouse labor is used

THE war has brought many problems to electric utilities, some of which have necessitated certain personnel to draw upon their imaginations and ingenuity in the substitution and improvisation necessary to make materials on hand meet immediate needs. This situation is prevalent throughout the industry and no doubt some of the processes used in these conservations and improvisations will be found to be economical and permanently retained as a part of the utilities' activities, while others will be discontinued as unprofitable or unnecessary as soon as the shortage of materials and manpower become less acute.

At the outbreak of the war, a Northwest utility found itself with a considerable amount of No. 2 solid soft-drawn copper wire in excess of its requirements. This wire was listed with the War Production Board as excess, but apparently other utilities had no need for this particular kind of wire as none of it was ever sold. Consideration was therefore given to the idea of reprocessing the wire and making it into sizes suitable for immediate needs.

The first attempt at this was in redrawing the wire to a smaller size, which was done by using a piece of tool steel 4-in. square and ½-in. thick, with a number of holes bored to proper size and reamed to a funnel shape. The power used to pull the wire through



Wire is annealed in 80-ft. lengths in a few seconds by passing 1,600 amp. through it. Power-driven take-up reel (center background) then draws wire through water tank for removing oxidation scale. Further cleaning is accomplished by immersing coils of wire in a dilute solution of sulphuric acid

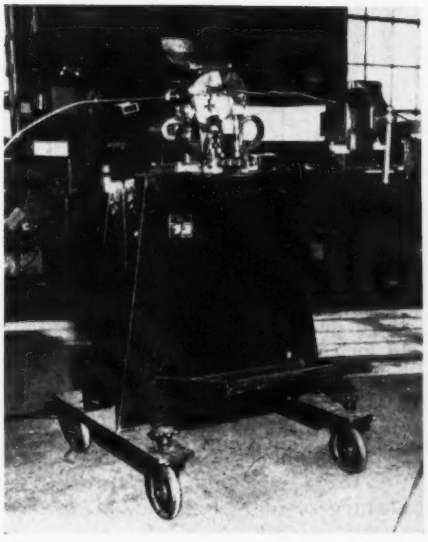
this improvised die was a set of blocks and tackle. This, of course, proved unsatisfactory, but it did demonstrate the feasibility of the operation. Standard dies were then secured and a transformer winding machine, which was not in use at the time, was converted into a machine to pull the wire through the dies. Provisions were also made for drawing through two dies in a single operation so that on the first operation, No. 2 wire would end up as No. 4. If No. 6 hard drawn was desired, a second operation would reduce the No. 4 wire to No. 5 and then to No. 6.

Since it is necessary for a wire being redrawn to be free of all copper oxide and in a thoroughly clean condition, a method was decided upon for this cleaning process. Two 30-kw. transformers were connected in parallel, giving 110 volts on the secondary. An oil switch was installed and two 250,000-cir. mil. leads extended to two contacts.

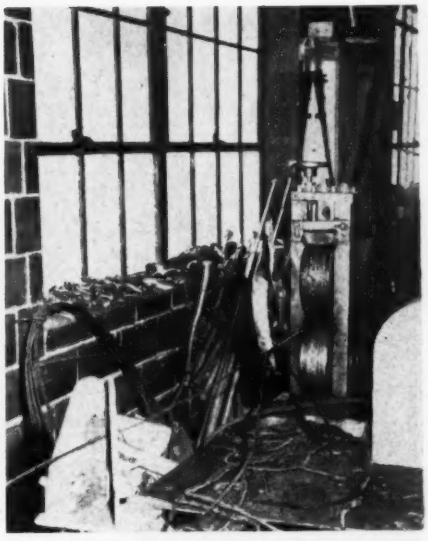
All splices and bad spots in the wire were removed and the pieces spliced together by the use of an electric butt-welder illustrated and reeled into standard size coils. A coil is then placed on a pay out reel and the wire extended through one of the above-mentioned contacts, and to and around an insulated pulley approximately forty feet away, then back to the other contact. The oil switch is closed and 1,600 amp. passed through the wire. After about one minute, the ammeter registers approximately 825 amp., and the wire is red hot. The switch is pulled and the wire drawn rapidly through the tank of cold water shown by means of a power driven take-up reel. As the wire comes in contact with the cold water, the oxide disintegrates and leaves the wire in an apparently clean condition. The coil is then placed in a solution of 16% sulphuric acid and water. After about an hour, the wire is removed and washed with hot water. As a further cleansing process, the wire is drawn through wire wool contained in a specially constructed box so arranged as to press the wool against the wire, which is now ready for redrawing.

A No. 3 wire is welded to the No. 2 and a No. 4 wire to the No. 3 for the purpose of starting the draw. The wire is then threaded through the No. 3 die and around a 14-in. drum three times; back around a 24-in. grooved wheel; through the No. 4 die and around a 17-in. drum to a drum whose speed is synchronized with the 17 in. drum, and from this to a take-up reel run on a slip clutch, which winds the wire into a standard coil. If No. 6 wire is desired, a second draw is made as previously mentioned. Beef tallow, contained in a receptacle fastened to the frame which holds the dies, is used as the lubricant. By the above method approximately 200 lb. of wire is reduced by two sizes in about fifteen minutes.

Although the process described, and shown by the accompanying photographs, has helped this utility over some rough spots during the past two years, it will no doubt be largely discontinued after the present emergency.

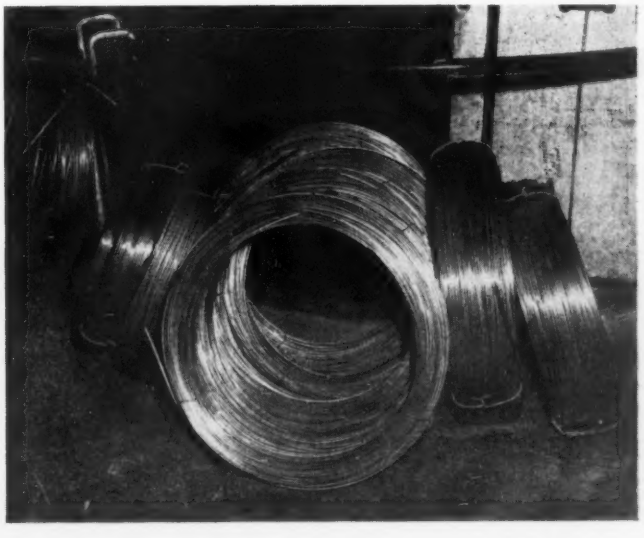


Splices are made with an electric butt welder. Burrs are clipped off and wire filed smooth. Splicing of lengths as short as 5 ft. is found economical



Home-made wire stripping machine removes insulation by passage of wire between steel rolls. Spacing between rolls is preset by piece of bare wire

Pile of old No. 2 weatherproof wire for which War Production Board found no purchaser is stripped, annealed, cleaned and redrawn into usable sizes of hard-drawn wire by Pacific Coast power company in co-operation with critical material conservation drive



Shiny new coils of No. 6 hard-drawn copper wire are produced from unusuable larger sizes and short scrap lengths in power company wire drawing operation. This wartime salvaging program will likely be discontinued when new wire is again available from manufacturers after the war

The Saga of the San Juan

Nature triumphs in forcing transmission lines from the storm-swept peaks of the Rockies, but engineers and linemen win battle to keep power flowing with new "highway" of copper

Perched precariously on rocky cliffs, the Silverton-Ouray, 44-kv. line of the Western Colorado Power Co. was re-routed to circumvent the caprices of nature in this rugged mountain domain

THE history of long-distance power transmission in the West is replete with episodes of the triumphs of power company employees over the elements of nature in order that the heartbeat of hydroelectric generators might course over tiny strands of copper, but in no section of the West has the drama of man's battle with the elements been more vividly portrayed than in the rugged Rockies of western Colorado. After 50 years, nature finally won its battle to force power lines in this section from its storm-swept crags, but it lost to an intrepid force of Western Colorado engineers and linemen, for power now flows over new "highways" of copper with ever greater dependability. Thus, an epic struggle with all of the worst elements of nature, at an altitude of more than 13,000 ft., in a winter-locked, avalanche-torn sector of the Colorado Rockies, to maintain electric service to a large part of the state's western slope inhabitants, has recently come to a dramatic finale.

For three months, crews fought sub-zero temperatures, raging blizzards and earth-quaking snow slides to build a 44,000-volt transmission line around and over a series of formidable thousand-foot cliffs and yawning chasms, in the famed San Juan mining district, probably the most rugged mountain domain in America. The "saga of the San Juan" was gradually and arduously unfolded on the ice-glazed face of a forbidding array of lofty crags, from the summit of which the courageous workers were suspended by cable in wind-tossed slings, constantly menaced by dislodged rocks and pelted and blinded by storm-borne sleet. For weeks these hardy men, led by P. C. Schools, the company's chief engineer, J. L. Jamison, construction superintendent, and foreman L. B. Fuller, drilled into stubborn granite, studding it with hard-won holes for reception of the dozens of poles and towers that were to carry the line.

At one stretch of the line, at an elevation of 13,100 ft., patrolmen previously had to work their way down over a 200-ft. precipice to inspect the copper strands, guy wires and a few poles. From this point it was impossible to ascend to the starting place above. Each time this hazardous chore was performed, an auto of a fellow-worker had to be in waiting for the patrolman at the bottom of the cliff. Thereafter, he had to travel 64 miles in the car to again reach the route of the power line to resume his inspection or return to his headquarters at Telluride.

Western Colorado's epic-making construction project included re-routing a portion of one of the most historic transmission lines in the world. In 1891 this line, together with the pioneers' Ames hydro plant, was a part of the field laboratory maintained by the founders of the Western Colorado Power Co. and by the Westinghouse and General Electric companies. This is claimed to be the nation's first commercial high-voltage transmission system for industrial purposes and was used for years in the solution of lightning, line loss, high-voltage and transmission problems and in perfecting methods of applying electric power to mine hoisting, drilling and other tasks.

Crew "Briefed" for Undertaking

Before undertaking the hazardous enterprise, Schools and Jamison briefed and rehearsed their task forces, like a Tarawa or Normandy invasion army. Even the pack mules that were utilized on the job had to be briefed—taught to negotiate narrow ledges and climb steps hewn in the solid granite, both loaded and bareback. Air compressors, jackhammers, air drill hose, steel, dynamite and other supplies had to be hoisted up steep cliffs with a winch on a line truck located hundreds of feet below.

Difficulties of terrain were nigh insurmountable, but the line was completed despite all obstacles. Chasms were spanned with cableways to transport poles and other materials as shown here. In other cases, pack mules were resorted to for transporting material

The location of snow slides which annually tore away thousands of feet of transmission line, interrupting service over a wide area of mining, fruit and agricultural territory, were known to the construction forces. These had to be by-passed or poles and line installed over or above them. In many instances this necessitated the wrestling of poles and tower materials over defiant peaks and spanning rock-jumbled chasms hundreds of feet deep. Over the chasms were erected cableways, along which poles and other construction materials were transported, sometimes with long and discouraging days of frustrated effort and of back-breaking toil. Every man on the job had to endure pain, injuries of varying degrees and discomfort which could not have been borne by workers of less physique, endurance and determination.

Wild Animals Kibitz the Job

The isolated region in which the line was constructed is the habitat of what is probably the largest aggregation of big-horned mountain sheep in the nation. These and other shy, seldom-seen creatures, including fox, elk, deer, bear and coyotes, were curious and suspicious witnesses of the daily toil of those who had invaded their remote dwelling places. The big horns, precariously perched on crags towering above the workers, were particularly venturesome and curious.

The route of the newly constructed line closely parallels the famous Million Dollar Highway, over Red Mountain Pass, containing one of the most spectacular and vividly colored mountain peaks in the world. Red Mountain Pass, at an altitude of 11,018 ft., is comparatively easy to patrol by car at practically all times of the year and is protected from lightning by the surrounding high mountains. All snow slides can now be crossed or detoured with safety, with high-strength material used as a conductor over these dangerous places.

The primary purpose of the new line is to connect with the 44,000-volt system on the north. The new line bypasses many miles of 11-kv. and 17-kv. lines and brings the maintenance and patrol forces down off of the higher reaches of the mountains. This arrangement will permit power to flow from either end of the system to the other, operation will be aided further by a complete new communication system of carrier current to be provided as soon as equipment can be purchased after the war.

Mop-up Job Still in Prospect

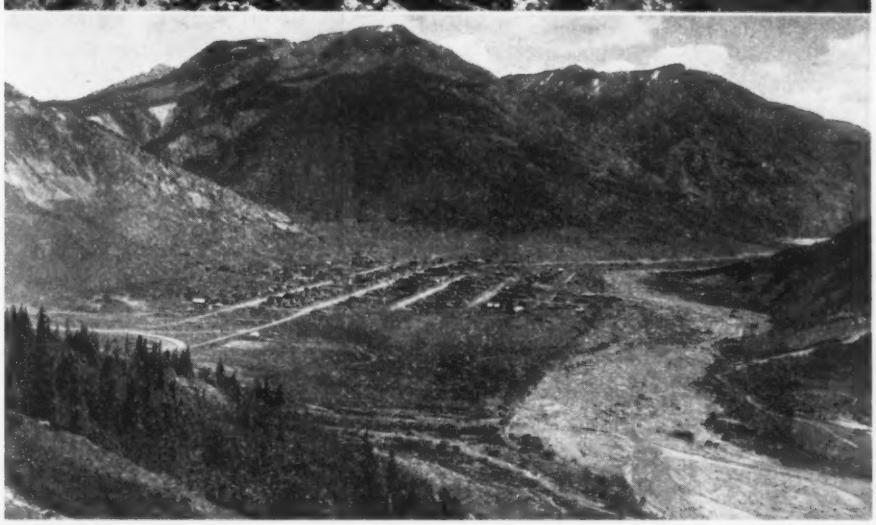
With completion of the new line, Western Colorado company's troubles are not at an end. The forces of nature dictate that, this year, to save annual destruction of thousands of dollars worth of line and other equipment and to do away wtih the hardships of patrolmen, there must be another difficult job undertaken, that of constructing a 44-kv. line over another pass, Ophir, to connect two other pioneer hydro plants into the main north and south bus. Thus, the battle with the elements of nature, which has gone on unceasingly for more than 50 years in that particular territory, will be terminated, with nature finally the victor.

Now, for the first time in 50 years, dozens of Western Slope fruit and agricultural localities, scores of mines in the Ouray-Silverton-Telluride districts and many industrial and commercial establishments will receive dependable service—the fight of the company on their behalf forming one of the most dramatic chapters in the history of the electrical industry of the West.

Silicone Synthetic Rubber

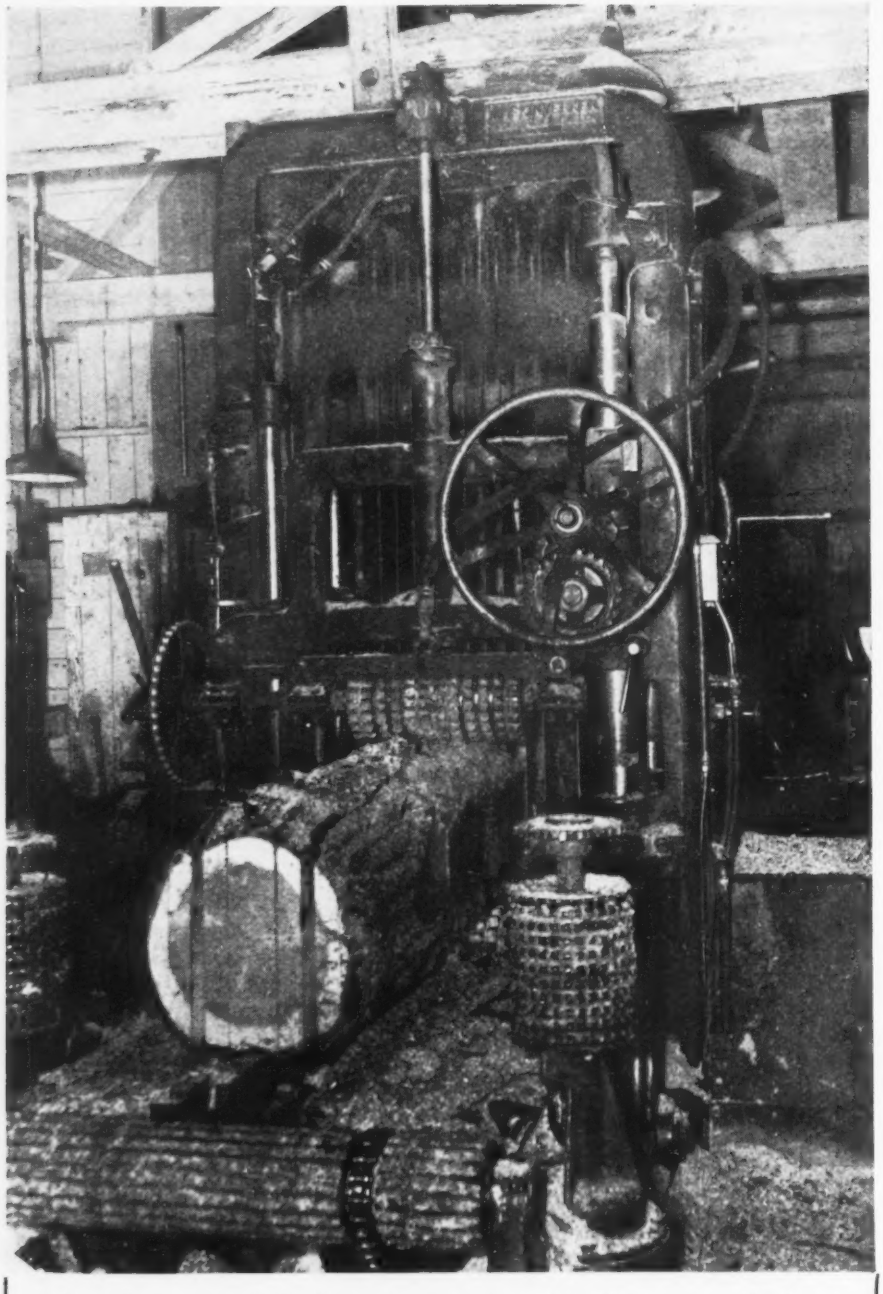
A new synthetic rubber as pliable as soft putty but which loses none of its elasticity at temperatures of 60° below zero and 575° above, is now being produced by a large electrical manufacturer. It is known as silicone rubber and can be stretched like taffy yet when rolled into a round mass, will bounce better than a natural rubber ball.

Silicon, present in sand and glass, is a close relative of carbon. Both form long, chain-like molecules called polymers. Silicone rubber is also a polymer, but its backbone is a series of units, each consisting of a silicon and oxygen atom. This replacement of the carbon with silicon-oxygen linkages is responsible in most cases for improved thermal stability. Silicone rubber can be made quite hard or soft.



Above: Copperweld span dropping down to span the Mother Kline snowslide, with a glimpse of Million Dollar Highway near Red Mountain Pass

The historic mining town of Silverton, Colo., nestles in a pocket of the rugged Rockies at the south end of the Silverton-Ouray 44,000-volt line



Inroads on stands of large timber in the Pacific Northwest have been so great in recent years that head saws of the so-called "Swedish" type are now beginning to make their appearance. This type of saw is said to be the only economical means of sawing up the smaller second growth timber in competition with the larger mills. Installation shown is at the Stebco Mfg. Co. plant, Vancouver, Wash. A number of parallel saw blades are mounted in a frame and driven up and down in a jigsaw fashion by a 150-hp., 440-volt, squirrel-cage motor. The log is cut into cants, or slabs, in one passage through the saw, instead of cutting one cant at a time as is done with the usual circular or bandsaw head rig. Logs cut at this Vancouver all electrically driven mill range in diameter from 10 to 20 in. and in length from 12 to 20 ft. Slabs coming from the head saw are then passed through a gang resaw of the ordinary type. In order to produce the maximum usable lumber from each small slab, the operator of the resaw must exercise judgment in positioning each slab before it is started through the resaw. A slight shift one way or the other often makes the difference between one more or less 2 x 4, say, out of a given slab. To aid in positioning the slab, a long incandescent lamp is used, below which are installed some parallel steel wires that cast shadows the full length of the slab, enabling the cut to be judged.

Signal Corps Blasts Pole Holes

An ingenious method has been developed by the U. S. Army Signal Corps for sinking telegraph or other poles in very loose sand where the ordinary method of using an earth augur is useless because sand fills the hole the moment the borer is withdrawn. The new method uses an explosive to blast a hole to any desired depth, and the pole is poised in such a way that it sinks instantly into the hole like a stone dropped into a well. Within a split second of the touching off of the charge, the pole is firmly planted in the sand at a depth of five to ten feet, depending upon the force of the explosive used.

There are five steps to the operation, as follows:

1. A camouflet tube, which is a mine so charged that its detonation dislodges the earth or other matter immediately adjacent to it rather than merely blasting a surface crater, is driven down into the sand, say to a depth of 5 ft.

2. A primer and 2 lb. of explosive (in the form of cartridges threaded on cortex) is inserted in the tube.

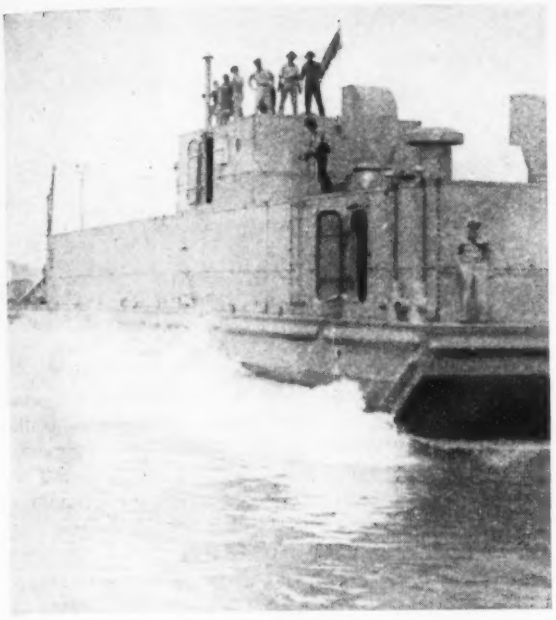
3. The tube is then withdrawn and the loose sand falls in on the explosive charge, filling in the hole completely, as though no operation had been undertaken.

4. The pole is then placed upright on the ground directly over the charge and is held in position by four light guy ropes.

5. The charge is then fired, and immediately the pole sinks to a depth of between five and six feet, where it remains firmly embedded, the loose sand falling in around it as packing.

If 2½ lb. of explosive are used, together with two primers, the same operation will sink the pole to a depth of 10 ft.

● Radio Frequency "Fences" are proposed by one communication engineer as a solution to overlapping of carrier channels on interconnected systems of the Northwest power pool. Such a barrier to radio frequencies would consist of a section of steel jacketed copper conductors in the interconnecting tie lines. The steel would need to be rusty or covered with something having similar physical properties to make such a barrier effective over a wide frequency range. It is considered impractical to use wave traps for each carrier to be blocked because of the large number that would be required.



Fresh Food for Fighters

San Diego electrical contractors help design, prefabricate and assemble barges in Australia

Launched in Australia, this fabricated-in-American refrigerated barge now brings fresh frozen food to the Army

IF it is true that an army marches on its stomach, then one of the reasons the United States Army is marching on so successfully in the Pacific is that it is getting fresh food from mobile bases that move up with it from island to island. And the prefabricated refrigeration barge, developed in San Diego by National Iron Works, with the aid of California Electric Works on the electrical facilities, E. Willardson on the plumbing, and Kahlenberger Refrigeration Co. of Fullerton on the refrigeration equipment, is doing its share to bring fresh food supplies close to the fighting forces.

The story of the development, making of a pilot model, the prefabrication of several more for knocked-down shipment to Australia, the assembly and testing "down under" supervised by four men who did the designing in San Diego, is one of the industrial romances of the war. Now several other yards are turning out refrigerated barges of similar character, but it was given to this West Coast group to pioneer the first.

Sometime early last year orders from the Army were given to make one such barge. General specifications were given but it was left to the engineering of the contractor and subcontractors to refine the details and turn out a workable unit. A standard 104-ft. x 29 x 8-ft.-deep barge hull with flat bottom was the craft selected for the first barge. On it was to be mounted a deck house 85 x 22 x 8 ft., and above this crew's quarters for four, 15 x 17 ft.

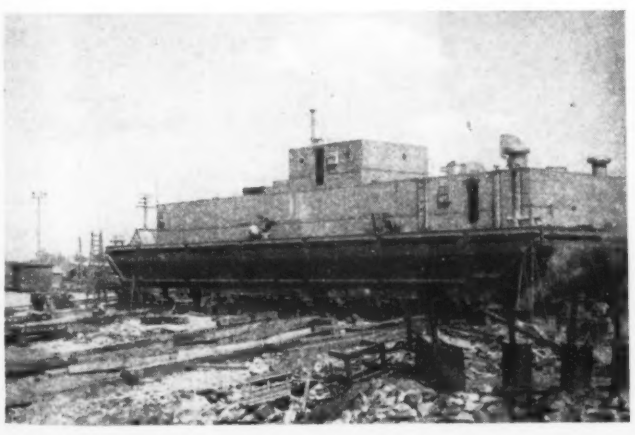
The hull was divided into four compartments accessible by hatches, in which the refrigerated storage was to be provided, held at a temperature of 10° F. The deck house was for dry storage and a daily issue space, which was to be kept at 40° F. The engine room, containing the diesel engines, refrigeration compressors, switchboard and control, was placed aft of the deck house storage space. Crew's quarters contained a mess hall and galley, heads and showers as well as CPO bunks for four crew members.

With the first barge under construction, orders were given for several more, the latter to be so fabricated as to be taken apart, the parts shipped to Australia to be reassembled. Directions were to be prepared in detail for the assemblers, and finally it was decided that for the first few the four designers themselves would be flown to Australia to supervise assembly and testing.

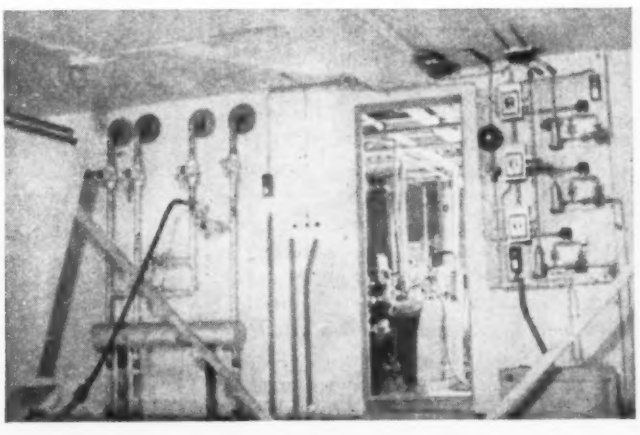
Accordingly Greer Ferver, of National Iron Works; Norman Ferguson, of California Electric Works; William Sweigart of E. Willardson Co., and Joseph Bernudas of Kahlenberger Refrigeration Co. were given specialists rating, put into uniform, inoculated and generally processed for overseas shipment, flown to Australia and there they directed the reassembly of the barges. It proved a good thing they did, for some of the equipment was damaged in shipment and had to be put back in working condition. Some of the assembling crews were Chinese. And besides, their skill, knowledge and experience was drafted by the Army to lay out further facilities contemplated when the Philippines had been regained.

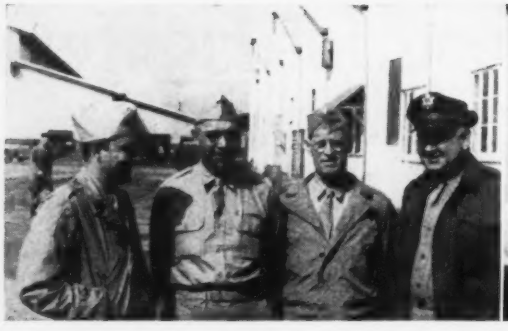
Electrical facilities on these barges were chiefly in connection with the refrigeration system and for lighting and to supply power for a deck hoist. The main refrigeration plant consisted of four diesel-driven compressors. For the dry storage space a blower unit employs a 3-hp. motor to blow air across the cold coils into the storage space. In the main refrigerated compartments refrigerant coils are used, supplied from the diesel-driven compressors.

Completely reassembled from parts shipped across the Pacific by crews in Australia from prepared directions



Control for the refrigeration system, employing an air pressure system with electrical solenoid operated valves





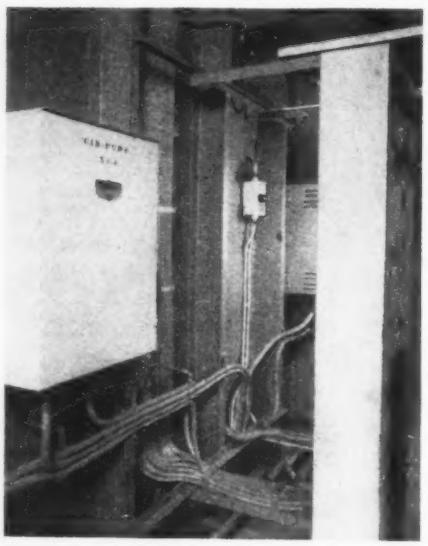
The specialists who were sent to Australia to supervise the assembly (left) Norman Ferguson, electrical, Joseph Bernudas, refrigeration, William Sweigart, plumbing and Major Firebaugh, U. S. Engineer Corps, in charge of the construction. Center, Greer Ferver, National Iron Works, chief designer of the barges. At right, Norman Ferguson with his Chinese crew of electricians, who installed the prefabricated wiring system under his direct supervision

These compressors were arranged so that three at a time would take the load, permitting one to be down for standby or repairs.

Electricity for lighting, motors and control, was furnished from two 10-kw. diesel-driven generators, one of which was a spare. A compact, small, dead-front switchboard was installed, with main switches for both generators and accompanying ammeter and voltmeter and control rheostats. From the main generator bus were tapped eight fused switches for lighting, power and interior communications circuits. Lighting consisted of illumination for crew's quarters and galley and for the storage spaces and machinery room, and for navigation lights and floodlights over the loading area on deck. Blackout switches were provided at all doors.

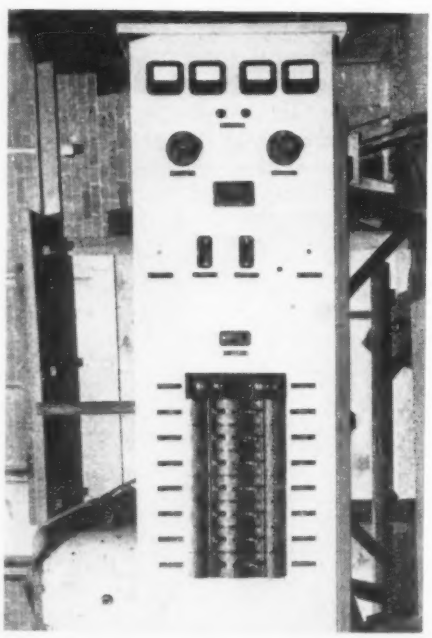
Power circuits supplied two circulating pumps, a blower for the air unit, vacuum pumps, oil pumps, exhaust fans, and fire pumps. Communications circuits supplied a general alarm system, the automatic refrigeration control system and telephone communication between various portions of the barge. The general alarm system sounds horns in all compartments, crew's quarters and on deck. The refrigeration alarm system gives warning of the shutdown of any refrigerator compressor or may be sounded in case of trouble in any part of the barge. Refrigerant used is Freon, which is non-toxic.

When the first barge had been completed the Army gave it severe tests in and around San Diego and towed it off to serve at some needed front base. Meanwhile the others were being made up for shipment. The advantages of shipping knocked-down were many. Barges could be stored on land near advanced bases and, when needed, assembled and put into service. Transportation of them could be speeded thereby, since the towing is a slow



Compact control switchboard in place with separate power panel and cable runs directly back of it on each barge

The main switchboard, with meters and rheostats at the top and fused switches for lighting and power circuits



process. Full directions for assembling were printed up in book form to accompany the shipment.

The barges were designed to operate three consecutive months without refueling or rewatering. They carry about 400 tons of cargo and weigh about 250 tons empty. In operations the barges are towed to a place near an advanced base and anchored, then are supplied periodically from a mother ship. Instead of setting up a refrigeration plant at a temporary base, these mobile storage bases can be moved with the troops as they advance. Crated for shipment each barge requires about eleven 50-ft. railway cars to transport. On assembly, sections are bolted together.

Norman Ferguson, construction manager for California Electric Works, San Diego, recounts an interesting log of experiences. He and the other three construction specialists were flown from San Francisco in September and were returned before Christmas. First they were sent to Melbourne where the parts had been shipped and at yards there supervised the reassembly. Ferguson had a Chinese crew of electrical workers in addition to some Australians. While in Australia he had an opportunity to visit Sydney and see some of the country.

Then the specialists were moved to Port Moresby and later Milne Bay, where they awaited the towing of the barges they had fabricated and were afforded an opportunity to check on their condition and performance after this 2,000-mile sea voyage. Since their return they have heard from crew members they helped train of the valuable service these floating cold storage plants have rendered the advancing army units clear to the Philippines.

While in one of these advanced bases the Colonel in charge took advantage of their technical knowledge and experience to "draft" them in preparing plans for more permanent ad-

vanced bases and their mechanical and electrical facilities. This, Ferguson said, gave him a great sense of pride in being of value to the war effort even after the job they had been sent to do had been completed. National Iron Works earned the Army and Navy E for its work in connection with these novel barges, an honor it shared with its subcontractors, one of which was California Electric Works.

Construction Outlook

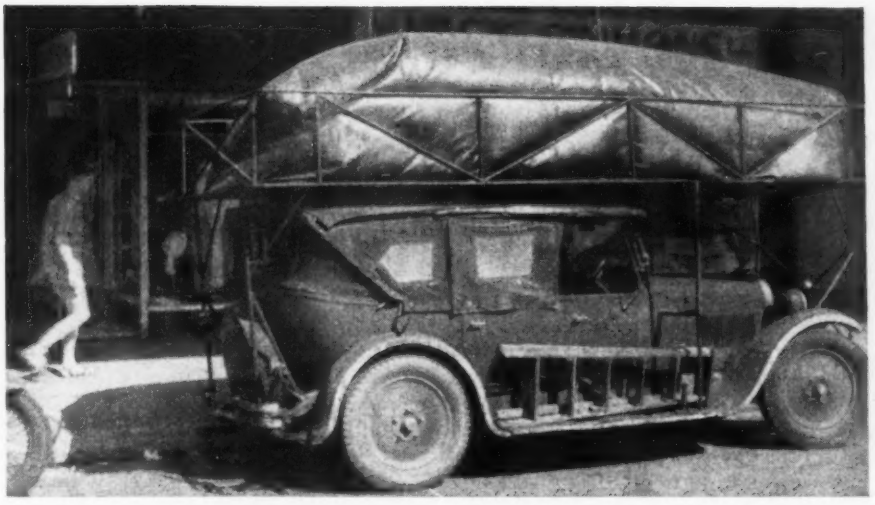
Business for contractors during 1945 does not appear to be as hopeful as the prospect was last year at this time. Hopes of return of some private construction work faded with the setback in December. Up to that time indications were that construction material might be available for more essential civilian construction, housing, business rehabilitation and reconversion. Instead controls were tightened on copper wire and spot authorizations for some civilian manufacture were sidetracked.

In the offing some big contract jobs may come from extensive Navy base construction in the Pacific, from the Central Valley Water Project channel for water diversion, for the Civil Aeronautics Authority's nationwide plan of expanding and reconditioning airfields, where lighting equipment will be a major item, much school construction and housing.

Revise Handbook

Revised drafts of two sections of the *Handbook of Interior Wiring Design* have been submitted for final approval to members of the technical subcommittee of the Industry Committee on Interior Wiring Design and the full committee was expected to pass on the material in February. Sections now under review are those on residential and farmstead wiring, and standards for multi-family dwellings and for commercial, public and industrial occupancies will follow.

At a preliminary review of revised drafts in New York, the technical subcommittee considered comments of agricultural engineers in educational, commercial and government fields. Of some 90 individuals and groups receiving the farmstead standards draft, 73% responded with approval or constructive comments, the subcommittee reported.



How an Australian electrical contractor solved the gasoline shortage was found by Ferguson, of California Electric Works, San Diego, and he snapped a picture of the conduit rigged balloon platform to hold charcoal gas for burning in this old Dodge touring car used by a Melbourne contractor for his service truck

● In Cooperation with the government request to curtail travel, the International Lighting Exposition scheduled for Chicago in April has been postponed until next year, it was announced by S. R. Naysmith, chairman of the Industrial and Commercial Lighting Equipment Section of NEMA, sponsors of the exposition.

Colorado Brownout

The government's "brownout" order bids fair to defeat its own purpose in Colorado, says the state's chief coal mine inspector, Thomas Allen, and the District 16 advisory committee chairman, T. E. Jenkins. Their report to Harold L. Ickes, government solid fuels administrator, states there is no shortage of coal in Colorado; that local coal cannot be shipped to localities where it is needed; that manpower considerations are practically nil since most mines are highly mechanized and require the same human attention whether operating at full or half capacity; that brownout restrictions are seriously interfering with production of stoker coal because slack is a by-product, and the slack, formerly sold principally to power companies as fuel, must now be dumped and allowed to consume itself by spontaneous combustion.

Protests by coal operators of the region, who call the brownout a "share the misery" mandate, together with supporting facts, have been sent to the department of interior for Ickes' consideration, Jenkins said.

● Optomic Color Guide — How to select colors of paint to derive the maximum value from the kind of light that falls upon it, whether daylight or artificial, and to minimize fatigue and promote safety is set forth in 18 rules, simply arranged, in a color guide issued by The Arco Co., of Los Angeles and Cleveland, titled *Optomic Color System*. The first eight rules specify colors that compensate for the deficiencies in natural or artificial light. The others aid in selecting colors for work areas, machinery and building equipment on a basis of measured contrasts and reflection factors to promote safety, efficiency and sanitation.

● Copper became more critical during the past month as the WPB limited each month's stock replacement purchases by wholesalers of copper wire to 25% of the amount of copper reported as shipped out of their stock for the second quarter of 1944. It meant that wholesalers could only get now 75% of their previous inventory in the second quarter. No more wire for repairs, under V3, will be allowed until July, and cords are to be patched instead of replaced, WPB orders repairmen, and no wiring at all is to be done.

● L-41 authorizes some residential construction but only under conformity with WPB and NHA requirements and an approval certificate from them. An amendment Feb. 5, in P-55-c makes this change for housing construction and remodeling.

● WPB got tough again by taking off the permission on certain unrated orders for electric motors and generators (L-221) and controllers (L-25) and elevators (L-89).

● Conduit prices went up a 5 or 10% last month, but were still under the ceiling price previously established. Stocks of conduit are said to be low.

Safety Lighting—Its Need Told the IES

"A BLIND man cannot get a license to drive but there seems to be no law against driving blind." "A night flier has a radio beam to ride in on but the night driver has nothing to guide him."

With such pungent whipcracks at the benighted condition of street and highways at night, outspoken little Ralph Dorsey, traffic safety engineer, City of Los Angeles, told the Illuminating Engineering Society, Southern California Section, that the industry must quit talking to itself and become evangelists to convert the public itself to the need for lighting on the streets and highways to save human life.

Dorsey ended a program on street and highway lighting, Feb. 7, at which he was preceded by Deputy Chief R. B. Caldwell, Los Angeles Police department; Wm. E. Lauer, street lighting engineer, City of Los Angeles, A. L. Pryor, street lighting engineer, Southern California Edison Co. and of which Leonard Towner, General Electric Co. street lighting engineer, was chairman. R. J. Crump, Smoot-Holman Co., section chairman, also talked briefly on the subject.

Police officer Caldwell said that police records of fatal accidents from motor vehicles were three times as great at night as in the daytime, where all conditions were common to both day and night except for light. He gave the opinion that drivers gain their experience driving in daytime and are unable to cope with the changed conditions brought about by darkness and less visibility. He enumerated the factors to which police attribute the increase of night accidents—1. the drivers' own reactions, 2. night blindness or glare, 3. intoxication, 4. excessive speed or overdriving of headlights, 5. road surfaces offering poor contrast to pedestrians or vehicles, 6. faulty or obsolete lighting equipment, 7. lack of road separations, 8. headlights—wrong beam, poor condition, poor adjustment, 9. brakes faulty, 10. pedestrian conditions—clothing color, attitude, experience, intoxication, adherence to rules.

He said that he felt improved lighting would be a material assistance in reducing accidents but declared it necessary to work on traffic law enforcement too. He said that of late there was a tendency of defense attorneys to capitalize upon the poor lighting conditions in cases charging their clients with manslaughter.

Lauer described how the city was converting old standards to make more satisfactory luminaires of them, increasing their height and extending the lighting unit over the street. Pryor discussed the lighting sources now available to do an improved job. (See below.)

In summing up, Dorsy declared it all very good to talk within the industry about the subject but where the missionary work needed to be done was with the tax paying public. He said that the right to see should be advocated as one of the important rights. If the public needed proof that it paid he said that if 100 lives a year could be saved that would represent a community value of $1,000,000. To fix up all the streets in Los Angeles needing correct lighting would take about $5,000,000 and cost about $2 per capita, but possibly might save $15 a year on insurance. Every means of publicity, he said, should be employed by every branch of the industry, with the IES sponsoring the campaign, to make the world a safer place. The public must be aroused to this need.

New Designs Salvage Light for Safety

Various sources evaluated and the importance of modernizing street and highway lighting with equipment which directs light correctly

A. L. Pryor

Street Lighting Engineer,
Southern California Edison Co.

THREE light sources are commonly used in street and highway lighting—the sodium vapor—the mercury vapor and incandescent.

Mercury Vapor Lamps

The mercury vapor lamp has hardly been given enough of a fair trial under proper application in this area for anyone to be sure of all its possibilities. Some demonstrations have convinced me that the smaller sizes—the 100- and 250-watt lamps—have no quality whatsoever comparable to incandescent. However, for such locations as around the Los Angeles Union Station and whiteways where extremely high intensities are desirable, the 400-watt mercury vapor lamp has a place. However, under no circumstances should a 16,000-lumen light source with so much glare be mounted below 30 ft. The lamp is too large to be completely shielded and yet get proper distribution.

Sodium Vapor Lamps

The sodium vapor lamps have probably saved more lives per lamp per year than any other light source. They have probably saved more lives per dollar cost than any other traffic safety device, and they no doubt have done more to prove the value of proper applications of lighting than any other kind of illumination. In addition to all this valuable evidence, however, it has been proved that its most valuable application is to isolated, unexpected major highway intersections where its amber warning color is one of its best assets. Some of this quality is sacrificed when too frequent use is made at less important locations.

When it was first introduced there were very few installations of other kinds anywhere, which were considered adequate and still fewer which used the same size lamp — 10,000 lumen.

Incandescent Lamps

Soon after the introduction of the sodium vapor lamp, better luminaires were developed for incandescent lamps. After having learned the need and value of the higher intensity in the sodium vapor lamp, it was soon learned that the same intensity of incandescent light in the new "modern

luminaire" would produce more illumination of a better quality—and at a lower cost.

Now if this is true, what makes it so? Should the old model "T" equipment be kept or should a postwar plan to modernize be developed instead? However, before any plan is approved, it would be wise to survey and study the entire subject thoroughly, and before a propect survey is made a few fundamentals may be discussed and some comparisons made of old and new types of equipment.

Old Type

First a city buys $1 worth of electrical energy and converts it into light simply by screwing in a lamp bulb and turning on the switch. But it does not become illumination until it falls on an object or its background. Neither light nor electrical energy has any value whatsoever until it is put to use. As illumination it is put to use in saving life, limb and property by improving visibility at night.

In the old upright globe 50 cents worth of that electrical energy is lost in upward light. It does not illuminate anything. Another 25 cents worth falls on the sidewalk instead of the street while 5 cents worth is obstructed by the top of the post which supports it. Glare is another thief which steals 5 cents worth. That makes 85 cents of that lighting dollar lost with three little nickels worth of safety illumination falling on the street like a trickle of water from a pipe full of leaks.

Modern Type

Light is of no value unless it is converted into street illumination. The new, modern, pendent, reflector type luminaire has many control devices for converting light into illumination.

In some applications a refractor, which is a prismatic piece of glass, is used to bend the rays of light to a desired pattern of distribution over the street surface.

A reflector redirects the 50% upward light to the street while a screen, known as a deflector, redirects the 25% from the sidewalk to the street.

Suspending the unit from an arm out beyond parked cars prevents the other 5% from being obstructed by the post or the cars themselves.

The light source being above the bottom of the reflector eliminates direct glare, while a diffusing globe minimizes the indirect glare.

Higher mounting further improves visibility by getting the light above the line of vision and gives more uniform distribution of light over the street.

The efficiency of this type of luminaire is retained indefinitely by sealing it tight against dirt and honey carrying insects.

Lower Maintenance

Operation and maintenance of a lighting system consists of many phases and its efficiency depends on the selection and use of such items as labor, transportation, electrical energy and type of equipment, its arrangement, mounting height, etc. A combination of all these items of expense is necessary in making a comparison of the results.

Take the average double light standard using two average priced $9 enclosing globes and two 2,500-lumen lamps for comparison with one modern pendent luminaire using a single 6,000-lumen lamp. At the end of one year, the total cost to operate and maintain 5,000 lumens of light using the two old upright globes was over $3 more than for 6,000 lumens in the modern type. But that is not all—the modern unit distributes many times more illumination, more uniformly, over the street.

Planning

Here are a few of the more common Do's and Dont's of reporting in any street lighting survey:

1. Obtain the services of a competent street lighting engineer.
2. Give him a map and all available information from such sources as the traffic safety committees, police department, street superintendents, schools, etc.
3. Have him submit comparative costs of all recommended changes.
4. Have him classify all projects according to the urgency of need.
5. Do not replace damaged equipment with the same type if it is obsolete and inefficient. Often the modern type is cheaper.
6. Use funds collected for damages to existing poles, etc., for modernization program.
7. If funds are inadequate to modernize an entire project start at the most important intersections and pedestrian crossings. Here do not be reluctant to change locations to obtain maximum silhouette effect.
8. The second step should modernize the next most important intersections, pedestrian crossings and danger points as shown by accident records.
9. Other modernization should follow by progressively filling in between new equipment previously installed.
10. All new projects should start off with original installations of the most modern and efficient equipment obtainable rather than accept the old equpiment reinstalled with its excessive losses and high maintenance.

High Lighting Bill

Introduced in California legislature for postwar

To provide a statewide highway lighting system for California as a postwar public works project, a bill was introduced in the California legislature by Assemblymen Carey, Sheridan, Dunn, O'Day, George D. Collins, Emlay and Rosenthal, on Jan. 24, before the recess. Known as Assembly Bill 797, it is an act to provide traffic safety lighting and signals on the main highways of the state, which it enumerates by number and terminals, for which an appropriation from the general fund of $25,000,000 is required. It would, if passed, direct the Department of Public Works to advertise for bids for such construction immediately following the end of the war.

It was introduced as a separate measure because the other proposed work making projects for highway construction ignored lighting and made no provision for other than freeway construction, under and overpasses, and other purely structural construction. The bill is being sponsored by the Junior Chambers of Commerce as a part of their long record of activity in behalf of safety and of street and highway lighting to improve safety. It likewise has the support of the unions and contractors who feel that postwar public works planning for employment should include electrification projects.

The bill has been referred to the committee on conservation and planning and is due for considerable activity when the California legislature reconvenes in March.

OPA Injunctions

Injunction suits alleging that 32 Denver electrical repair shops have violated OPA regulations have been filed in U. S. district court by Earl T. Thrasher, district enforcement attorney.

Other complaints against Denver area electrical repair establishments are in preparation. Furthermore an investigation of western Colorado repair shops will be launched shortly, Thrasher predicted.

Regulations require that electrical repair shops file statements of maximum prices with their local war price and rationing boards. Many have not complied; as a consequence, the district OPA office has been authorized to fix maximum prices and enforce compliance.

LIGHT for an OFFICE

fluorescent

The Need

Handling funds and doing considerable paper work for the United States Treasury, a large volume of business was handled and personnel was increased and work area expanded. Before relighting errors by personnel were abnormally high. After thorough investigation officials decided costly errors could be avoided by providing adequate illumination. War Production Board investigation concurred in the lighting need.

Installed

Room measures 115 x 69 ft., with 14-ft. 9-in. ceiling. In continuous rows, 8 ft. apart, 12 ft. from the floor, 206 Wakefield Grenadier units, two-lamp, 40-watt F lamps, were installed.

Results

After five months operation an average of 35 ft.-candles is maintained on the working plane.

Who

Federal Reserve Bank, Salt Lake City. Engineered by F. W. Wakefield Brass Co. for Graybar Electric Co., Salt Lake City. Installation made by Capitol Electric Co.

LIGHT for a SHOWROOM

cold cathode

The Need

Adequate illumination, that would be decorative as well, for the showroom of an automobile selling agency, and functional lighting for the parts department, cashier's cage, and entrance way from the repair shop.

Installed

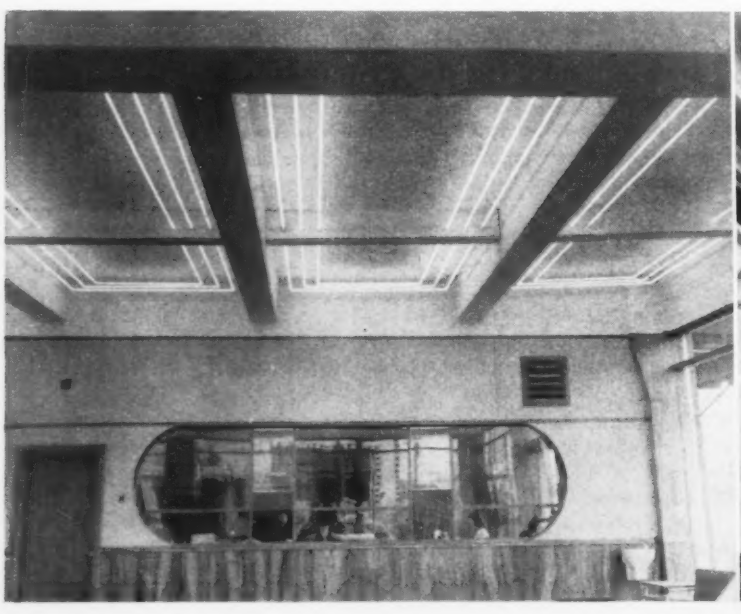
In the showroom, which had paneled ceiling between heavy beams, a total area of 40 x 45 ft., 12 ft. high, 1,600 ft. of 18-mm., 60-ma. warm white Zeon tubing. Parts department: 40 x 70 ft. 12½ ft. high, 1,800 ft. of the same tubing. Cashier's cage: 14 x 12 ft., with a sloping ceiling, 96 ft. of warm white Zeon tubing, 18-mm., 60-ma. Entrance way between showroom and repair shop: 8 x 12 ft., 8 ft. high, 100 ft. of 18-mm., 60-ma. warm white Zeon tubing. High power factor transformers were used. Electrical usage equals five watts per running foot of tubing. Ceilings were used as reflectors and tubes were unshielded.

Results

Initial intensities—showroom 65 f-c, parts department 60 f-c, entrance way 75 f-c. Advantages of the lighting include: Merchandise may be displayed at any place throughout the lighted area, it is shadowless, there is no noticeable heat, no stroboscopic effect, low maintenance and 10,000 hour life of tubes, low surface brightness.

Who

Logan Oldsmobile Co., Portland. Designed by, equipment and installation by Electrical Products Corp. of Oregon.



EMEA *Dope Sheet*

Two Clean Cut Shop Ideas

Lacquer thinner is versatile; acid-alkali does wonders, says National Industrial Service Assn.*

LACQUER thinner has the property of attacking, softening and removing practically all types of paint, baking varnish, grease, etc., and as it evaporates very quickly, it does its dirty work, then evaporates to do no damage.

One of its handiest uses around a small motor shop is in freeing up governor weights that may have baking varnish in their mechanism from being dipped. If this happens after the jobs come out of the oven, the governor weights are stiff and gummy. By applying a small amount of thinner to the weights and working them back and forth and blowing them with compressed air to remove the softened varnish, the weights are instantly freed.

Another very handy use is when baking varnish gets into the tapped screw holes in a stator frame and is baked hard. When this happens, before the job can be assembled, this varnish has to be cleaned out of the hole and the threads before the screws will go in. Pour a little thinner into the hole and let it stand a moment or so and then run in a tap or the screw, remove it and blow out the hole. The varnish is gone.

If varnish gets on the shafts of armatures, apply a little thinner before polishing the shaft. The varnish will come off much more easily. Likewise, it will remove the varnish from name plates, etc., very readily.

After soldering connections to bakelite switches, brush the bakelite plate with thinner, using a small, stiff-bristled paint brush to remove the surplus soldering flux, because if this flux is left on, very frequently it will cause the bakelite to break down.

If, after installing a bearing, you find it to be a "little tight" and you want to "break it in," apply a little thinner instead of running it dry, and you will find that it will help in breaking the bearing in, prevent any galling of the bearing and it will produce a smooth fit.

Keep a small oil squirt can of this thinner on the assembly bench at all times. Above are just a few of its many handy and time-saving uses. There are dozens more, as you will find after trying it.

An effective and inexpensive cleaner for all brass, copper, aluminum and other small parts is often needed.

Brush holders, short-circuiting devices, etc., can be thoroughly, quickly and inexpensively cleaned to look just like new by this method. All that is needed in the way of equipment is a small two-burner (preferably gas) hot plate. Two metal cans of about 5-gal. capacity, a 2-gal. size earthenware crock and a sink or small washrack, equipped with a drain and a cold water faucet with a shower attachment. This serves as a cold water rinse.

Place the two 5-gal. cans on the hot plate and fill about ⅔ full of water. To one of them add about 5 lb. of caustic soda or Oakite. Leave the other with the plain water in it to serve as a hot water rinse. Bring these to a temperature of 180° F. (Not necessary to boil.) Next pour about 1 gal. of nitric acid into the earthenware crock and to this add about ½ gal. of sulphuric acid.

Instructions for the use of this cleaner are as follows:

1. String parts to be cleaned on wire and place in caustic for several minutes (except aluminum). Only leave aluminum parts in caustic for a very short time as caustic will deteriorate aluminum very rapidly.
2. Remove parts from caustic and rinse in cold water.
3. Rinse parts in hot water and let drain.
4. Dip parts in acid, remove and place under cold water rinse.
5. Rinse thoroughly in cold water shower and then give them a second rinse in hot water. The hot water will leave the parts warm and this will cause them to dry very quickly.
6. Blow off and thoroughly dry parts with compressed air.
7. When the caustic solution becomes weak, add about a double handful to the solution.

It is suggested that if possible it is best to locate this cleaner in a small room by itself or in a corner of the shop as far away from the machinery as possible, as the fumes from the acid, while being used, are very objectionable and also, if too close to the machinery, may have a tendency to cause bright metal parts to rust slightly. A small exhaust fan to remove the fumes to the outside should be installed, if possible, and then there will be no difficulty encountered.

This will prove to be one of the handiest additions that can be made to a small motor shop, due to the thorough way in which it cleans the parts, making possible not only a better appearing and better operating part, but it also permits reuse of many parts that otherwise would be scrapped.

* From a bulletin exchanging ideas—this one from H. E. Grant, of Nashville, Tenn.

Los Angeles

L. F. Richardson and G. A. Harmon, Jr. of Bailey Meter Co. presented the subject *Electronic Instruments for Industrial Processes*, a talk based on a paper written by P. S. Dickey and A. J. Honfick of the Bailey Meter Co., at the dinner meeting of the Electrical Maintenance Engineers Assn., Inc. of Southern California, Feb. 21. The paper had been previously presented to the ASME and was highly recommended. It consisted of a talk, illustrated by a series of slides, and showed the basic circuit diagrams related to the principles of operation. Slides were also shown and a discussion held on the application of electronic instruments to industrial measurements, control and calculation.

The electronics class sponsored by Westinghouse was also held prior to the dinner meeting as usual.

At the previous executive committee meetings, the following committees were appointed by the chairman: *program*, Nels E. Swanson; *technical*, Emerson S. Reichard; *fraternal and attendance*, Donald H. Byl; *publicity*, Henry Bush; *special entertainment*, Jerry Ellis; *finance*, John Zuponcic; *membership*, Carl J. Trainor; *public policy*, Clarence R. Miller; *welfare*, Linders L. Warner; and *educational*, Julien H. Davis, past president. Clarence Miller is now president. Henry Bush, publicity chairman.

Portland

The difference between static, dynamic, and dynetric balancing was discussed and actually demonstrated by J. M. Consley, steam supervisor, Westinghouse Electric & Mfg. Co., Portland and Seattle, at the Jan. 25 meeting of the Electrical Maintenance Engineers'

At the EMEA meeting in Portland held in Westinghouse shop, Joe Hoag, left, conducted dynamic balancing test while C. P. Merklin, president of EMEA, watched. J. M. Consley, Westinghouse steam turbine engineer, was speaker

Assn. of the Columbia Basin held at the Westinghouse plant in Portland.

Consley started his talk by describing static balancing, went to dynamic balancing and then discussed dynetric balancing. A demonstration followed his talk. A dynetrically balanced 15-hp. motor was thrown out of balance dynamically and yet left in balance statically. The motor was run and the membership could see that a rotating piece of apparatus can be in static balance and still be out of balance dynamically. The rotor of the motor was then actually balanced in the machine, reassembled, and run to show the lack of vibration after proper balancing.

Attendance at this meeting was a record, with 138 present. Average attendance up to now has been about 55 from a membership of 74 active members as of the first of February. C. P. Merklin is chairman and A. J. Flechsig is secretary-treasurer.

● Bugs are not officially dead if killed by a concentrated beam infrared lamp, according to stipulation from the Federal Trade Commission to the Fostoria Pressed Steel Co. to discontinue certain claims in its advertising of the Leray unit. At least the latter may not claim any special quality or property except heat, or that the heat is not harmful to man or animals too, if used in such concentration as to kill the insects. And as for aid in treatment of athlete's foot, no soap, said the FTC. Fostoria has agreed to cease and desist its claims, but users will probably go on killing fleas on their dogs with them, use them as heat lamps, dry their hair with them or otherwise make use of the concentrated heat beam.

● Resistance Welding Control training has been prepared by Westinghouse in the form of a seven-part course, complete with sound slide films, books, quiz material and instructors manual and, after being given to classes of employees in San Francisco, Los Angeles, Seattle and Portland, will be made available to other groups at reproduction cost of $50.

Showcase Test Board

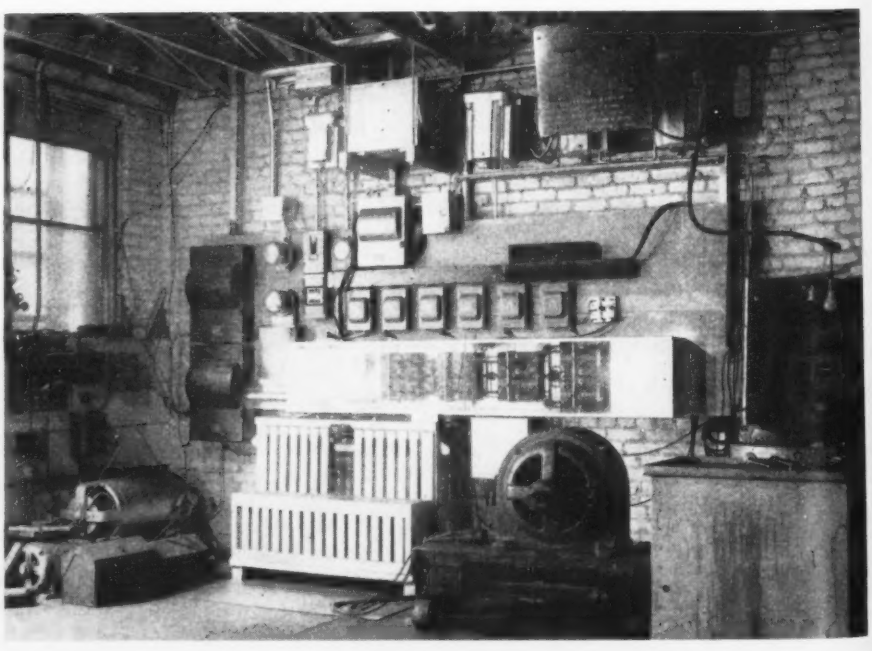
In a showcase where they can be seen by customer and shop man, the disconnect switches used in connection with testing of rewound motors or control equipment at Backstrand Bros., Riverside, Calif., are truly on display. So is the entire testing board now being remodeled by Merrill Mungerson, shop superintendent for Clarence Backstrand. The job is not completed yet, but when it is, all gutter, switches, transformers and fittings will be neatly arranged, painted aluminum, and the main disconnecting switches and the contactor will be behind the glass of a large metal and glass gutter along the bottom of the board.

Below the board is now located the salt water resistances, housed in back of the wooden pickets. Later the motor-generator set, now along the end wall, will be moved under the board as well. The two switches on the upper part of the board in the illustration are to come off and one is to be installed in the end of the glassed-in gutter. Then an attractive fluorescent lighting trough will be installed above the front of the board and the entire assembly will truly be a display piece as well as a test board.

The leads for the 2,200-volt power, coming through the brick wall from transformers in a vault on the other side, are kept in a metal box just below the center of the board when not in use.

Mungerson fabricated special handles for the switches in the glassed-in trough in order to operate them from the outside and top. The work is being done as time and materials permit.

Partly rebuilt is the testing switchboard at Backstrand Bros., Riverside, where the operating diconnect switches are under glass for display and demonstration



Protest Article 250

Article 250, of the National Electrical Code, was made the subject of a request to enter a minority report of dissent by the International Brotherhood of Electrical Workers, recently. The IBEW dissented on the basis that Article 250 as proposed, violated three principles of safety by allowing removal of insulation from any conductor on the load side of the service disconnecting protection (particularly the neutral in this case), the connecting of an uninsulated conductor to ground or a grounding electrode or to the frame of any electrical equipment or nonconducting equipment on or near a building. The protest is aimed at permission of the use of bare neutral in any interior wiring system.

Position taken by the National Electrical Contractors Assn. in respect to bare neutral was that the war agencies had forced the use of bare neutral in many installations as a measure to conserve insulating rubber and that, if experience with such installations does not prove hazardous, contractors cannot logically oppose its further use. This is an age-old controversy and these skirmishes before the meeting of the Electrical Committee indicate that it will continue to be controversial.

Motor Rule Proposals

Promised in the Preview of articles to come for this issue, an article on the reasoning back of proposed changes to Article 430, Motors and Controllers, of the National Electrical Code, prepared by Frank Short and a committee of the Southwestern Section, IAEI, has been sent to *Electrical Contracting* magazine for publication in its March issue.

It was felt, after consultation with the committee, that it would be more appropriate in that publication at the present time in view of several circumstances.

First, this report of proposed changes, made to the Southwestern Section last August, was crowded out of the discussion period and referred bodily to the Article 430 committee of the Electrical Committee, NFPA. The reasoning for the proposed changes had no chance of being heard. Since the Electrical Committee is scheduled to meet to revise the Code in May, national publication of the reasoning was considered to be important in order that serious thought could be given to the proposals and the reasons for them.

Furthermore since the proposals generally seek to bring the National Electrical Code into conformity with already existing and tested legislation in California through the Industrial Accident Commission's Safety Orders, there is no issue in that state as to whether these rules should be adopted. They have been in force for many years and experience has proved their necessity.

Basically the difference between the National Electrical Code motor and controller rules and those of the Accident Commission are that the former were designed to protect the equipment, the latter to protect workmen in handling or working on the equipment. The committee reasons that if the National Electrical Code is to be truly a National Code it should do both and eliminate the necessity for separate safety codes or special provisions in local ordinances.

Sylvania Winners

Two winners, the only two from far Western utilities, were awarded $50 prizes in Sylvania Electric Products Inc.'s national contest among utility company lighting men, by Bart Wickstrum, Western division manager, and P. Carlstroem, northern California representative. Prizes went to W. C. Macy and Gilbert Trosper, both of Pacific Gas and Electric Co., last month. Macy won sixth prize, Trosper the eleventh and they were the only pair of winners from any single utility from the 43 which had entries throughout the country.

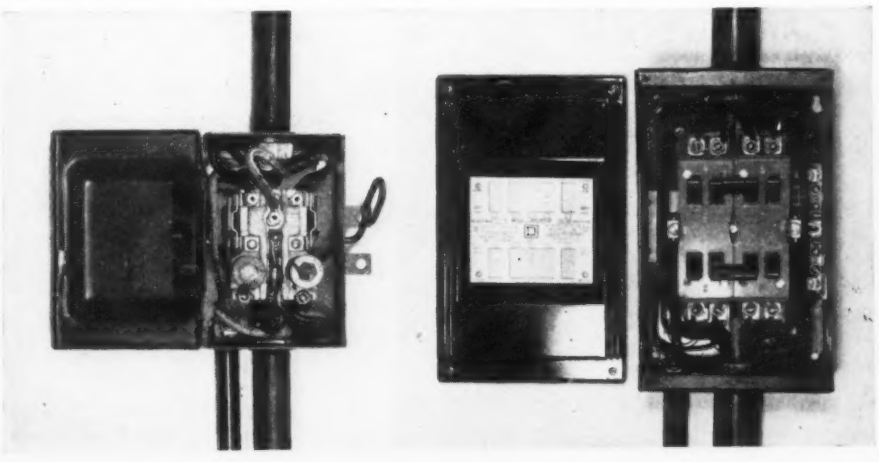
The contest was for utility lighting men only, the idea being, according to Wickstrum, that such men have had the most opportunity to observe every make and type of lighting fixture and to know the shortcomings of all. A contest among them for designs for new commercial fluorescent fixtures, employing four 40-watt lamps and two 2-lamp ballasts, should bring ideas and designs to correct previous faults and probably offer many new features and improvements.

P. Carlstroem presents Sylvania awards to Gilbert Trosper and W. C. Macy, only Pacific regional winners in contest

Entries were made last October, designs submitted before Dec. 1, and the judges, Howard Sharp, president of IES; Allan E. Parker, Worcester Polytechnic Institute; C. A. Carpenter, electrical engineer; and Lurelle Guild, consultant on product design, rendered their decision late in January.

Sylvania reserved until Mar. 1, 1945 the option to purchase any design or feature submitted, either to make or incorporate in its own designs. Fourteen prizes in all were awarded, the first four winning a trip to New York City to receive the prize.

Too late for publication with his article in January 1945, p. 68, J. G. Moyen sends the evidence in picture below. At left the usual 30-amp. entrance switch, crowded and inadequate; once installed is a major operation to replace. At right, the 70-amp. circuit breaker which gives the overload protection for all branch circuits, has ample wiring space even for No. 4 service conductors, and under Article 2351a and 2371a-3, also serves as main disconnecting means. He advocated that inspectors require larger entrance cabinets as they do raceways



To Modernize School Cooking

Standard units designed to fit with appliances in homemaking classrooms of tomorrow's schools

HOME makers of the future come from the schools of today. What is the situation in the homemaking classes in today's schools? How is the equipment standing up? If some modernization is to be done after the war, just what should be done?

Such questions came to the mind of Henry C. Rice, manager of domestic sales, Southern California Edison Co., when the company's home economists, assisting in the government food conservation program, described the state in which they found many homemaking classrooms whose equipment was obsolete and often broken down. About half the equipment in southern California schools is electric, but very old.

This situation aroused his curiosity as to what should be done when times permit again. So homemaking teachers in schools throughout the territory were asked. Their opinions were written down, sifted, sorted and analyzed. Three problems seemed predominant. First, equipment was obsolete — all equipment. Second, classes were overcrowded. Third, there have been many changes in personnel, new teachers, new pupils from different parts of the country, all unacquainted with local conditions and methods.

Ideas and suggestions were gathered for over a year. Then these were taken to the State Chapter of California Architects with the request that this organization work over the suggestions and make definite plans and recommendations.

Walter R. Hagedohm, AIA, president of the organization at the time, interested himself in the idea enthusiastically. He appointed a committee to develop plans and specifications for remodeling existing homemaking departments as well as for incorporation into entirely new school buildings. These plans developed in the form of units of standard dimensions which could be combined in groups to suit various arrangements of floor space. The plans and specifications are to be made available to any school without cost and it is possible that cabinet makers or manufacturers of kitchen equipment may make them as standard packaged units at a low mass production cost.

Hagedohm explains that the unit that his committee designed is based on the dimensions of the apartment model electric range, both as to height, width and depth so that it can be combined with such ranges in various combinations in a classroom. There is the single unit, and the double unit, each with standard drawer, sliding shelves and side opening door, linoleum or micarta top. The top is separate so that if more than one cabinet unit is wanted under a single top this can be arranged. It is called a food preparation unit for homemaking departments of schools.

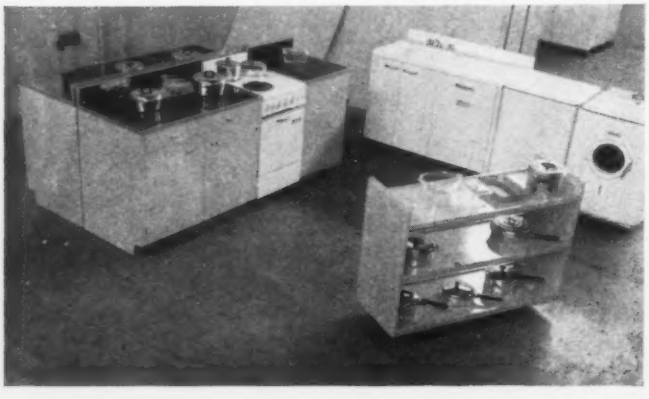
Among the various problems on which the teachers asked for assistance were: what to do about the coats, books, rubbers, etc., which the girls bring in to class and drop on the top of the tables, and also what to do about the distribution of supplies to the girls in class. The architects' committee came up with two very simple but excellent ideas for these.

Walter Hagedohm, prominent architect, who presented the unit kitchens

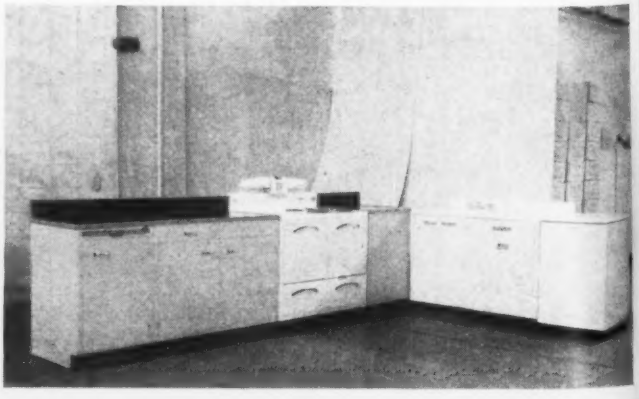
A coat and book cart on large rubber coasters, was designed to provide space for coats, a shelf below for rubbers and galoshes, and spaces on the top deck for books, purses and small packages, each a separate compartment. It is wheeled into the room, the books, coats, etc. put into it, wheeled over to the cloak room or somewhere out of the way until class is over. Thus no such unsanitary luggage is placed on the food preparation table tops.

Similarly a modified idea of a tea-wagon cart was designed to use in distributing food and supplies. Previously girls crowded into the small supply room, wasting time and supplies. With the cart, the monitor appointed to handle supplies can load the cart from the store room and wheel it around to distribute to each working position or group.

Two of many possible arrangements of the cabinet units with appliances. Below, the dishwasher sink, dryer and automatic laundry along one wall, supply cart in the center, and cabinet units back to back with small range



Where the homemaking cooking classroom is small, work space may be desired arranged along the walls. Below, two double units together, a standard size electric range, and a single unit on one wall, the sink and dryer the other



How then to tell the school people of these contributions to better planned homemaking departments in the future? First the plans were submitted to school homemaking department heads, their ideas incorporated, and discussion held as to how and when to present these ideas to others. The Los Angeles county teachers' institute, on Feb. 20, provided the opportunity. It was held in the cafeteria at the Compton Junior College, Feb. 20. On the program, at 7:30 p.m., a place was made to present and explain the *Trends in the Development of Functional Equipment for Home Economics.*

In preparation for this opportunity, Edison Co. had made samples of these units, both in single and double groupings, and mounted on casters in order to move them about easily to show various arrangements possible. They were painted green to differentiate them from the white appliances which were to be shown grouped with them. Rice obtained from the manufacturers of the region their last samples from their factory displays for this demonstration.

Hotpoint sent by express from Chicago a kitchen sink with disposal and dishwashing unit. General Electric lent a range from its Art Linkletter radio show. Bendix lent a last remaining washer. Hammond furnished one of its experimental model clothes dryers. Charles Moore, Chicago Flexible Shaft Co., assembled a Mixmaster from parts. Others furnished other "museum piece" appliances for this show.

It was found in the previously mentioned surveys that few homemaking departments had a washer, an ironer, a dishwasher, a clothes dryer. Yet girls trained in such schools are to be the users of such home equipment in the future.

Likewise it was found that such departments themselves had a serious laundry problem, keeping the pupils supplied with dishtowels. When they were washed it took too long for them to dry for another class to use the same day. This required so large a linen supply that schools were taxed to find, let alone wash and dry so large a stock.

When the presentation was made to the homemaking teachers and school executives and administrative officers at the institute, all of these points were emphasized by the speakers. An automatic washer and dryer was advocated for each school.

Edison Co. arranged to serve the dinner. Over 125 reservations were made for the dinner, and only 40 had been expected in preliminary estimates. Interest in the idea was high. The idea that was liked particularly was that, if the school was crowded, either as to space or money, it could start the modernization of its homemaking department a unit at a time, adding more as funds and space became available.

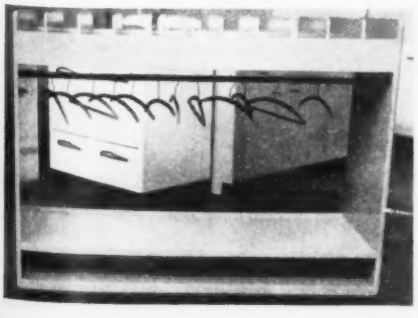
Miss Blanche Taylor, principal at the Roosevelt School, Compton, served as chairman at the institute dinner. Mrs. Theia Kamerer, home economist for the Edison Co., spoke briefly of her work with schools. Rice told the electrical appliance part of the story, speaking of the importance of bringing the school children of today who are to be the homemakers of tomorrow in contact with the devices which they will be using in their own homes. Hagedohm then told of the standard units developed to meet the requirements of schools. As he talked the units were arranged in various groupings with the appliances to illustrate the flexibility of these cabinets in meeting various room sizes and arrangements.

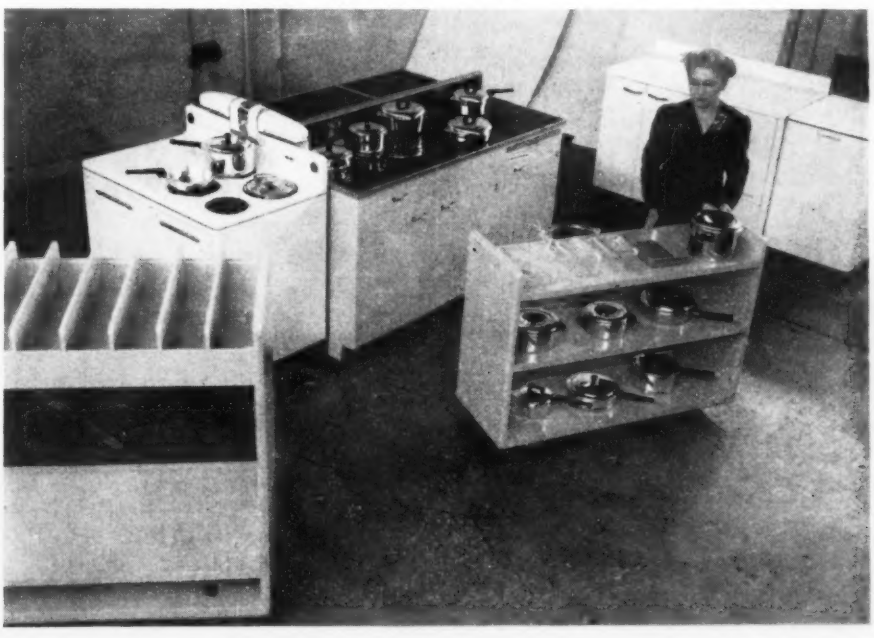
House Party

Art Linkletter, popular Western master of ceremonies, has been engaged by General Electric Co. for a new program originating from the studios of KNX, Hollywood, titled *The G-E House Party*. The program was launched Jan. 15 and is heard every weekday afternoon, coast-to-coast, Monday through Friday, from 4:00 to 4:25 p.m., E.W.T., which is 1:00 to 1:25 P.W.T. and 2:00 to 2:25 M.W.T. The program is over the network of the Columbia Broadcasting System and is sponsored by the appliance and merchandise department of General Electric Co. at Bridgeport, Conn., in support of retailers and to further preparation for postwar businesses. All G-E appliances and products are advertised on the program to give listeners an idea of the new things to come. The program itself is an audience participation type of program with interviews by Linkletter and other features supplied by this agile ad lib master of ceremonies. Linkletter was radio director for the San Diego and San Francisco fairs.

● SPOKANE will become headquarters for, and will have the first unit of, a chain of electrical supplies stores for which articles of incorporation were filed Jan. 3 with the secretary of state in Olympia, Wash. The new firm will go under the name of Prudential Distributors, Inc., and is capitalized at $100,000. It has opened offices in the Kuhn Building in Spokane. Retail outlets will be opened in cities throughout this region as soon as electric goods are available, according to the incorporators, who include: Bernard L. Swerland, S. S. Freeman, and Stuart Wilson, all of Spokane.

Another combination, with range at the end and a double and single unit together, back to back (right). Mrs. Kamerer, Edison home economist, at the service cart to bring supplies from the store room. Below, and in the picture at right, is the cart devised to hold coats, rubbers, books, purses, etc., carried into class by the girls. It will keep these things from the clean work surfaces where food is prepared





A Clue To What People Will Want To Buy

Portland survey discovers the preference for electrical appliances and gives dealers "inside information" useful in planning ahead

ANOTHER fellow's figures are apt to look pretty meaningless, at first. A second look, and a searching mind, however, may find in them reflected the likes and dislikes, the preferences and the intentions of his own customers and prospects.

While figures of Portland might only be thought of as interesting to dealers and distributors in Portland, a second look shows them to be more than that. They are something of a guide that can be used, with adjustments to local conditions of course, by dealers throughout the West. Examined in that light the recently completed survey of the Portland consumer market, made by R. L. Polk & Co. for the *Oregon Journal*, is a clue to what people may be expected to want and buy most anywhere else.

To arrive at a reliable estimate of their market, the retail merchants of Portland asked for this survey. *Oregon Journal* engaged R. L. Polk & Co., publisher of the city directory, to do the job at a cost of approximately $15,000. Its employees, already known to Portlanders, were well received in their interviews and the information was derived from a carefully selected one-out-of-each-20 population sampling, carried on last summer. Area covered was that of the "city zone", extending slightly beyond city limits, comprising 112,960 families, numbering 387,360 persons, of whom 81.85% live in single-family houses, 6.25 in multiple and 11.9 in apartments. Over 72% own their own homes. Average rental paid is $33.33. More than 66% own cars, 3.9 more than one and 30.84 have pianos.

Taken from the survey and reproduced here are several tables. These were selected as probably more indicative of trends than the remaining data. Every page of the 104-page survey is packed with interesting information. From it these tables were selected by ELECTRICAL WEST. *Electrical Merchandising* is making a more detailed report on the survey for those who wish greater breakdown.

First are tables of the postwar market, (1) in replacements, and (2) new appliances which those interviewed intend to buy after the war, arranged in order of choice and differentiated between large items and small. Also shown in accompanying tables are the kind of refrigeration now in use and in another table the age of refrigerators in single-family, multiple and apartment houses.

The groups, enumerated as 1, 2, 3, and 4 in these tables represent groups arranged in accordance with present appliance ownership. Group 1 represents 13.86% of the population which owns nine or more appliances. Group 2 is 33.43% of the population which

The Postwar Markets—1 Replacements

The Items of Electrical Household Appliances Which Will Be Replaced First, After the War By Appliance Ownership Group

	By Group 1 Families	By Group 2 Families	By Group 3 Families	By Group 4 Families	Total Demand
Washer	4,140	9,080	7,000	2,900	23,120
Vacuum Cleaner	2,400	5,260	3,320	1,180	12,160
Electric Iron	2,160	5,340	6,220	5,680	19,400
Refrigerator	2,060	4,160	2,440	1,600	10,260
Range	1,520	3,200	2,360	1,600	8,680
Toaster	1,120	3,440	3,400	2,280	10,240
Radio	880	2,660	3,020	2,040	8,600
Mixer	600	340	120	40	1,100
Waffle Iron	420	520	400	300	1,640
Mangle	280	120	40	0	440
Water Heater	120	520	140	60	840
Sewing Machine	80	380	260	180	900
Clock	40	60	20	20	140
Lamp	40	60	60	0	160
Electric Roaster	20	20	0	0	40
Freezing Unit	20	40	0	0	60
Electric Plate	0	40	20	80	140
TOTAL	15,900	35,240	28,820	17,960	97,920
TOTAL FAMILIES	15,660	37,760	31,640	27,900	12,960
% of Families Needing to Replace Electrical Equipment	101.54	93.33	91.09	64.38	86.69

Because some families mentioned two or more items as needing replacement total items can exceed total families.

Kind of Refrigerator According to Ownership Group

	Group 1		Group 2		Group 3		Group 4		Total By Type
	15,660		37,760		31,640		27,900		112,960
Ice	260	3.16	1,320	16.02	3,020	36.65	3,640	44.17	8,240
Electric	14,900	17.17	34,540	39.79	23,800	27.42	13,560	15.62	86,800
Gas	380	12.42	520	17.00	1,420	46.40	740	24.18	3,060
TOTAL	15,540	15.84	36,380	37.08	28,240	28.79	17,940	18.29	98,100

Percentages are based on the total of each type of refrigerator.

Total Refrigerators—By Make

Age of Refrigerator	Single Houses	% of Age Group	Multiple	% of Age Group	Apartment	% of Age Group	Total Age Group
Under 5 Years	30,600	85.67	2,440	6.83	2,680	7.50	35,720
% of House Group	37.69		45.19		23.27		36.41
From 5 to 7 Years	21,080	86.82	1,360	5.61	1,840	7.57	24,280
% of House Group	25.97		25.19		15.97		24.75
Over 7 Years	29,500	77.43	1,600	4.19	7,000	18.38	38,100
% of House Group	36.34		29.62		60.76		38.84
TOTALS	81,180		5,400		11,520		98,100

NOTE: Percentages are given both ways. The first figure is the per cent of the Age Group. The second figure is based on the number of refrigerators in each type of dwelling.

owns seven or eight appliances. Group 3 is 28.01% of the population and owns five or six appliances. Group 4 is 24.7% of population and owns four or less appliances.

The survey for local purposes was broken down into 15 residential zones and segregated according to four income groups. However the above grouping by appliances already owned perhaps better fits the average for most cities. From them estimates of what may be bought in the future can be made, and is the only one reproduced here. Other items studied included length of employment, length of local residence, type of home, number of bathrooms, linoleum, roof, time since last painting, type and age of furnace and other information not pertinent here. Even hobbies were listed.

What is of interest was that irrespective of income, 31.57% habitually buy merchandise in the higher priced class, 35.97% buy medium priced merchandise and 32.45% seek the low priced merchandise. Also interesting is that all but 7.9% make regular savings, more than half, 58.26% save more than 10% of their income, 25.53% from 5 to 10%, and 8.26 under 5%.

Portland may be taken as typical of cities in which war production has swollen the population. One factor which may not be typical of other similar communities is that 54.93% of the homes are wired for ranges and that 47.03% have electric ranges installed. While 70.22% are piped for gas, only 37% use gas. Also noted is that 47.54% of the gas ranges are over ten years old and thus become prospects for replacement. Water heater saturation (electric) also is high, 24.07%.

Age of electric ranges in use is likewise of interest. Under five years old —45.52%; five to ten years—31.14%; over ten years—23.34%. Apartment houses, with 11.71% of all electric ranges, had 20.81% over ten years old.

In commenting on Polk's survey, James B. Buman, manager, residential and rural sales, Northwestern Electric Co., said, "You will note that with all its market ramifications electrical merchandise is in a very conspicuous position."

The Postwar Markets—2 New Appliances (A) Large Items

The Items of Electrical Appliances Which Families Do Not Now Own But Which They Intend Buying After the War

	First Choice Group 1	Group 2	Group 3	Group 4	Total First Choice	Second Choice Group 1	Group 2	Group 3	Group 4	Total Second Choice	Third Choice Group 1	Group 2	Group 3	Group 4	Total Third Choice	Total Demand
Range	1,140	3,320	4,340	2,440	11,240	100	780	1,200	1,680	3,760	0	20	240	380	640	15,640
Refrigerator	240	1,680	3,680	5,540	11,140	80	120	660	1,800	2,660	20	60	180	440	700	14,500
Mangle	1,840	4,460	2,160	400	8,860	240	440	600	280	1,560	40	100	280	180	600	11,020
Washer	300	880	2,440	4,160	7,780	20	240	800	120	1,180	40	60	160	520	780	9,740
Sewing Machine	340	1,440	1,060	460	3,300	20	420	600	680	1,720	0	0	40	60	100	5,120
Vacuum Cleaner	120	500	1,120	780	2,520	0	340	500	400	1,240	0	40	60	280	380	4,140
Water Heater	740	960	860	120	2,680	140	240	420	140	940	40	40	0	40	120	3,740
Radio	180	440	780	580	1,980	60	140	100	160	460	60	0	40	120	220	2,660
Freezing Unit	340	480	80	80	980	..	..	..	..	..	..	..	..	..	..	980
Victrola	40	20	120	80	260	0	80	..	..	80	..	..	..	..	..	340
Mixer	0	0	80	60	140	0	0	20	40	60	..	..	..	..	..	200
Iron	0	40	60	20	120	0	0	20	0	20	0	20	0	20	40	180
Waffle Iron	0	20	0	80	100	0	0	0	0	0	..	..	..	..	..	100
Electric Roaster	0	60	20	20	100	..	..	..	..	..	..	..	..	..	..	100
Lamp	40	0	..	..	40	0	0	0	20	20	..	..	..	..	..	60
TOTAL	5,320	14,300	16,800	14,820	51,240	660	2,800	4,920	5,320	13,700	200	340	1,000	2,040	3,580	68,520
% Each Choice	10.38	27.91	32.79	28.92	100.00	4.82	20.44	35.91	38.83	100.00	5.59	9.50	27.93	56.98	100.00	

The Postwar Markets—2 New Appliances (B) Small Items

The Items of Electrical Appliances Which Families Do Not Now Own But Which They Intend Buying After the War

Mixer	1,440	5,980	6,020	3,340	16,780	100	880	1,920	580	3,480	40	40	80	140	300	20,560
Toaster	360	1,360	1,540	3,660	6,920	80	400	560	400	1,440	20	0	40	20	80	8,440
Vacuum Cleaner	180	1,080	1,860	2,480	5,600	20	100	1,020	420	1,560	20	0	20	40	80	7,240
Waffle Iron	200	620	620	880	2,320	40	200	360	300	900	0	0	0	0	0	3,220
Iron	460	420	680	660	2,220	60	320	260	80	720	0	0	100	40	140	3,080
Lamp	0	180	120	100	400	40	20	100	80	240	0	0	0	0	0	640
Radio	120	80	140	120	460	0	20	20	20	60	20	20	0	80	120	640
Roaster	100	140	100	160	500	0	0	0	0	0	0	0	0	20	20	520
Clock	60	80	40	80	260	..	..	..	..	..	..	..	..	..	..	260
Mangle	0	100	20	40	160	0	0	0	40	40	0	0	0	0	0	200
Electric Plate	20	40	20	40	120	..	..	..	..	..	..	..	..	..	..	120
Victrola	0	100	0	20	120	0	0	0	0	0	0	0	0	0	0	120
TOTAL	2,940	10,180	11,160	11,580	35,860	340	1,940	4,240	1,920	8,440	100	60	240	340	740	45,040
% of the Total of Each Choice	8.20	28.39	31.12	32.29	100.00	4.03	22.98	50.24	22.75	100.00	13.51	8.11	32.43	45.95	100.00	

Non-Existant Mart

But for a market that wasn't there, interest ran high on new appliances

FOR a cancelled market, there was quite a crowd around the Merchandise Mart in San Francisco the week of Feb. 5. Originally scheduled as a means of necessary trade contact for an essential industry, then rumored cancelled, official word reached manufacturers and distributors after their plans were too far advanced to make cancellation practical; many from out of town already had arrived in San Francisco; others had their displays set up. Buyers and dealers also had adjusted their schedules to be at the Mart that week to discuss present and future prospects. Therefore, although officially "not held," there was no absence of traffic around the eight floors of the Mart Building and no lack of wartime merchandise to be seen.

Although electrical merchandise display was still missing in any quantity, a few advance models ready to go, an item or two off the production line before the Belgian Bulge killed the spot authorization program, gave the appliance floors their most promising appearance in several markets.

Franchising was high on the list of topics under discussion wherever appliance manufacturers and dealers gathered. Manufacturers and distributors reported that the majority of their old dealers were still in business and would be taken care of as soon as possible. While many newcomers are eager to sign up now for delivery whenever merchandise is available, general attitude toward franchising of new dealers was "to go slow." An opinion expressed several times at different headquarters was that it would be poor policy all around to franchise any but prewar dealers until delivery commitments could be made.

Made cautious, though by no means disheartened, by the collapse of the spot authorization bubble, no one would hazard an answer to the $64 question—when will civilian production begin? One guess is as good as another, was the consensus, meanwhile plans are ready for quick conversion when the signal comes but war work comes first.

Most electrical manufacturers are either now developing or are sending out feelers toward store display guidance as a means of increasing dealer sales. Several distributors have added kitchen cabinet lines and one or two are looking toward complete kitchen units.

At the Crosley display, N. B. Dinkel, Western regional manager, and Mace Feudner, of California Electric Sup-

Reading from top of page down: J. T. Barrett (right) and L. Lynch of Kaemper Barrett, Admiral distributors, set up a model to show the manufacturer's Flexo Plan for store arrangement. How to increase efficiency while lowering costs in laundry and kitchen was demonstrated in the Westinghouse set-up, which placed the two rooms side by side. J. M. Tenney, Norge Western sales manager, shows one of the prewar quality ranges manufactured under the spot authorization plan. H. D. Rice and L. D. Stull, of Apex, had three washing machine and three vacuum cleaner models to display. N. B. Dinkel (right) of Crosley Corp. and Mace Feudner of California Electric Supply Co., with the Crosley shelvador refrigerator which is ready to go into production

ply Co., northern California distributor for Crosley, reported that there had been no retrenchment in sales organization since the Belgian Bulge: vacancies which might have been left standing were being filled as they occurred. "We had a set back but the 'go ahead signal' may come anytime and we are ready anytime," Dinkel summed up. Displaying the Crosley Shelvador refrigerator, and promising a two-temperature refrigerator and two deep freezer models postwar, he said it was a little too early to give details on the new kitchen cabinet to be produced by the company. "It's going to be a radically different cabinet, new thinking completely, something that will not be just part of the wall but will add to the wall," he explained.

L. D. Stull. Western division sales manager, and H. D. Rice, at the Apex Electrical Mfg. Co. headquarters, had three washing machine and three vacum cleaner models on display; reported that many were asking "just to pat them." Apex is giving a preference certificate to old dealers, about 90% of whom are still in business, and expected to start franchising within 30 days. When reconversion comes, the company will at first make one model washer only, so that every dealer may have a sample on his floor and definite information as to "when" and "how much" he is to receive. After the peak is reached on one model, the next will go into production.

Charles A. Meier had just announced formation of his new business, the M. and M. Sales Co., and was greeting his friends in space 467 at the Mart. Asked what the second "M" stood for, Meier replied: "Morganthau. He is a partner, might as well include him in the firm name."

J. T. Templeton of H. R. Basford Co. was showing a Premier vacuum cleaner, Gibson refrigerator and Zenith phonograph. He is not signing up new dealers, he reports, until he has definite information as to when and how much he can deliver. As a dealer aid, he has had designed and put into production a record display cabinet, which is adjustable so that it can be used in the center aisle, against a wall or as part of a window display. Inexpensive as well as adaptable, the cabinet has raised record sales as much as 200% in certain stores, he reports.

Hotpoint had no exhibit, but H. J. Scaife, Western regional sales manager, and E. J. Baughman, district sales manager, were on hand to meet dealers and answer questions. The company is engaged, they report, on store arrangement and other postwar sales assistance plans. Edison General Appliance Co. is ready to introduce new lines of automatic cycle home washers and home freezers in the immediate postwar period, they said. With the materials situation as it is, spot authorizations received by the company turned out to be hunting licenses rather than actual authorizations, they explained, and while many items are available, others are on the restricted list requiring high priorities.

Admiral Corp. had set up a model store to demonstrate its Flexo Plan for appliance arrangement. J. T. Barrett and L. Lynch of Kaemper Barrett were at the company's Mart space to explain the plan and to take requests for a booklet to be sent later. They also had photographs of a postwar Admiral radio cabinet design combining radio, phonograph and television in one set.

Kaemper Barrett distributes Royal vacuum cleaners as well as the Admiral line, but no models were on display.

General Electric was showing its wire recorder and also had on display the Rad-i-air germicidal lamp and an infrared heat lamp which may be screwed into any lamp or electrical fixture, both of the latter items priority free. Also exhibited in the G-E booth was the Richards Electro-Fence made in Payette, Idaho. Good news for owners of worn-out monitor top refrigerator models was G-E's replacement unit, one of which was shown. A flat top cover goes over the replacement unit to give a neat appearance. To get a replacement, the old monitor top unit must be turned in, D. W. P. Larnach of General Electric Supply explained, and dealers are on an allotment basis.

Drawing cards at the Leo J. Meyberg headquarters were a bona fide prewar quality Norge range, one of a few thousand made on spot authorization, and Eureka's new cordless iron. Although not available for display, the new Domestic electric sewing machine was being introduced by a special exhibit in the Meyberg booth. Made by the manufacturers of the White sewing machine, this unit will be marketed through dealers and distributors only. Other appliances shown were the Hamilton clothes drier, the Bendix washer and the Norge refrigerator. Meeting dealers with the Meyberg representatives was J. M. Tenney, who started with Norge in the West 15 years ago and recently returned as Western sales manager. Tenney reported that Norge will add an automatic laundry and a freezer postwar.

In an exhibit which owed much of its attractiveness to color and lighting, Westinghouse showed a model kitchen and laundry, side by side. This arrangement saves space and steps, increases efficiency, and cuts plumbing costs, it was pointed out. Near the kitchen and laundry set-up was a large and well-arranged display of irons, none of them for sale. A. B. Murphy reported that the company was taking franchises and that some were still open. It will give some form of store arrangement assistance, but has nothing to announce until experts in that field have completed studies, he said.

"A little of anything you see is for sale," said Joseph Etienne of Thompson & Holmes. Although this did not include any of the electrical appliances handled by this distributor, there was a large display of candles, plastic hose, baby pens and other items which have helped keep business going during the war. Although no Universal products could be displayed, Landers, Frary & Clark is still pushing its U Plan for V Day dealer assistance plan, Etienne reported.

Gordon E. Wilkins Inc. had an Ironrite model on display and Wilkins stated that the manufacturer will start with the standard model and, as soon as possible, will go to the folding model, which was new before the war. Wilkins had a Stover water softener and says he wants to tie it in with laundry sales after the war. Most of the troubles experienced with electric laundry equipment come from hard water, he explained. Wilkins is signing up dealers for the St. Charles Kitchen, which he represents. These are custom-built kitchens, the customer selecting one of several layouts, and the company making the installation, which includes sink, cabinets, linoleum, dinette, everything except the electric appliances.

Thomas E. Cahill of Nesco was on hand with a display of kitchen wares —no roasters for sale, of course.

At the Kelvinator space, Cal Fleeson reported that the company has inaugurated a new protective franchising plan to include competitive prices, limited models, quality, step-up, dealer assistance. To help dealers determine fair trade-in allowances when postwar buying begins, Kelvinator has established a trade-in department. The company also will help with appliance department layouts.

Easy Washer did not have a special display, but at its Mart headquarters Fred Fenton was busy talking with visiting dealers. Mrs. Joseph, who was helping Fenton answer inquiries, said that no new dealers were being signed except as fill ins where the old dealer had gone out of business and few of these are needed, since the majority had weathered the war.

Roy Emery of the Frank Edwards Co. had a Deepfreeze model in operation. The company will start production on its prewar apartment house model first, he said.

Edward F. Hale Co. appliance division had a demonstration model of the Filter Queen bagless vacuum cleaner and Charles Galliano was on hand to explain the new dealer contract under which cleaners are sold now for delivery after production is resumed. Frank Wallace, Western representative of the Horton Mfg. Co., was at the Hale space to tell about his company's line of laundry equipment.

Lamps were not much in evidence, although R. D. West, Pacific Coast representative for the Mantle Co., had come from Portland with a display of Aladdin lamps, prewar models. M. Milo of Milo Mfg. Co., San Francisco, took space to show a line of lamp bases and shades, results of 4½ weeks of production following authorization. Milo will sell direct to dealers, a little to everyone, he said.

Chicago Reactions

According to San Diego electrical distributors who have returned from visits to the Chicago mart, San Diego dealers may expect changes in both margins and prices of electrical appliances after the war. Many eastern manufacturers are considering the possibility of establishing two prices: an eastern retail price and a price for territory west of the Mississippi. Should such a policy be carried into effect, price differentials that once existed between Pacific Coast and Western cities will tend to disappear.

All returning mart visitors agreed that manufacturers are strongly considering lower margins in many of the major lines of electrical merchandise. Studies are being made of ideal dealer operations so that guides can be set up to aid the dealer in operating all phases of his business as efficiently as possible—thus counteracting the lower margins.

Actual production of appliances is still farther away than most appliance dealers have been led to believe, according to the mart reaction. Nine months hence was the earliest estimated date the first of new appliances will reach dealers' hands. The necessity of accumulating reserves of materials, setting up machinery, and production lines, and the training of personnel seemed to be the biggest time-consuming problems faced by eastern manufacturers.

Several distributors stated that eastern manufacturers expressed satisfaction over the manner in which Western jobbers have conducted their businesses prior to and during the war, and gave assurance that the West Coast would receive every consideration when production is resumed.

June in January

Show how frozen storage will change home habits

HOW to have a June table in January was demonstrated to home economists in the northern California area Feb. 12, when General Electric Co. staged the West Coast premiere of its educational film on the preparation of foods for freezing. Importance of frozen foods, both commercially and home prepared, in the postwar and trends in this field were discussed by B. M. Tassie, G-E appliances sales manager for the Pacific district, and Elizabeth Madigan, home economist from the company's Consumers Institute at Bridgeport.

A full color sound movie, the film employs a new technique, developed by the armed services for educational films, in which a basically simple step-by-step procedure shows how the work is done. Preparation of vegetables and fruit at home and of meat commercially are shown.

Dubbing the home freezer the baby of the electrical appliance field, Tassie declared that the industry has a big educational job ahead of it. Because they were sold on price instead of size, 68% of the refrigerators in home use are too small, he said, and an extra unit in the basement for storage is a postwar possibility. Bread, coffee, oranges, cold cream are just a few of the items which keep better in the refrigerator, he pointed out, and when housewives become conscious of this, they will want two units, one for storage.

While distribution is the bottleneck in the frozen food industry today, it will not be after the war, Tassie said, and told of plans for a door-to-door distribution of frozen meats and vegetables, as milk is now delivered. By buying when foods are plentiful, the price of the freezer could soon be saved, he declared.

Mrs. Madigan pictured the convenience of home freezing of items such as desserts for next week's party, sandwiches and other delicacies generally not considered as coming within the field of frozen foods. Eggs, she explained, can be frozen in the ice cube tray, a means of preserving the whole egg or the temporarily unneeded yolk or white. She warned, however, against being a "collector," citing the man who had displayed year-old strawberries "as though they were gold nuggets." Freezing is a convenience, she stated, and there is no reason for loading a freezer with more than can be used.

In her discussion of methods of home freezing which preceded the showing of the film, Mrs. Madigan stressed the importance of care in selection and handling of foods to be frozen. Freezing does not make a first grade out of a second grade product, she emphasized.

Novel home help offered to customers

Dial Your Dinner

A novel "Dinner Spinner" that promises to antiquate most menu and cooking charts, and to become a real kitchen boon to housewives interested in saving both time and food in cooking, is being offered by the home service department of the San Diego Electric Co. to its customers.

Because meal planning is often a difficult task due to erratic food shortages, plus the fact that many women engaged in war work are pressed for time, the Dinner Spinner is a handy shopping guide and an automatic planner of well-balanced meals.

To plan a meal the housewife has merely to dial any one of the twenty varieties of meats and roasts listed on the face of the Spinner. There she will find complete instructions for its preparation, seasoning, cooking time and temperatures, its vitamin and mineral contents, together with a suggested menu for a well-balanced meal. If any of the menu items happen to be unavailable, the Spinner lists many alternatives that can be used to provide an equally nutritious meal.

On the back of the Spinner are found handy hints on the preparation and cooking of 18 vegetables, tips on braising and stewing meat, suggestions for making tasty dishes from leftovers, instructions on the care of gas or electric range, a baking chart and a list of kitchen weights and measures.

The Spinner is twelve inches square and can be hung on the kitchen wall

Protection for Three-Phase Pump Motors

Suggested remedies for preventing single-phase operation with consequent damage to equipment

W. D. Skinner

Farm Power Advisor, Pacific Gas and Electric Co.

INSTALLATION of two-element overload relay protection for three-phase motors used in agricultural pumping plants will provide protection against single-phase operation as a result of a break in the secondary, and also in the event of a low-voltage condition or a heavy overload. However, there are conditions where two-element devices cannot be depended upon to protect the motor against damage.

Where three-phase motors are supplied with power from delta-wye or wye-delta connected transformers, it is necessary to provide three-element protection. In the event one of the primary lines should be opened by blowing a fuse or a line break, all three wires on the secondary side will carry current, one carrying about twice as much as the other. If this excessive current should happen to flow in the unprotected phase where two-coil overload protection is provided, a motor failure will occur, providing the motor will not shut down under full load operation when this single-phase excitation takes place. Circuit diagrams showing how this can occur when delta-wye or wye-delta connections are used are shown in the accompanying illustration.

Wye-delta or delta-wye connected transformer banks with the neutral isolated for supplying three-phase power are used quite generally throughout the country. On the PG and E system 90% of the transformer banks are connected in this manner. Reason is that the advantages far outweigh the disadvantages in this method of service. Some of the advantages are that this arrangement is more flexible and it costs substantially less. Furthermore, an occasional motor burn-out is not as serious as the increased liability of telephone interference and transformer burn-outs that are experienced with other connections. This is especially so when motor burn-outs can be prevented by the use of three instead of the standard two-element type of protection.

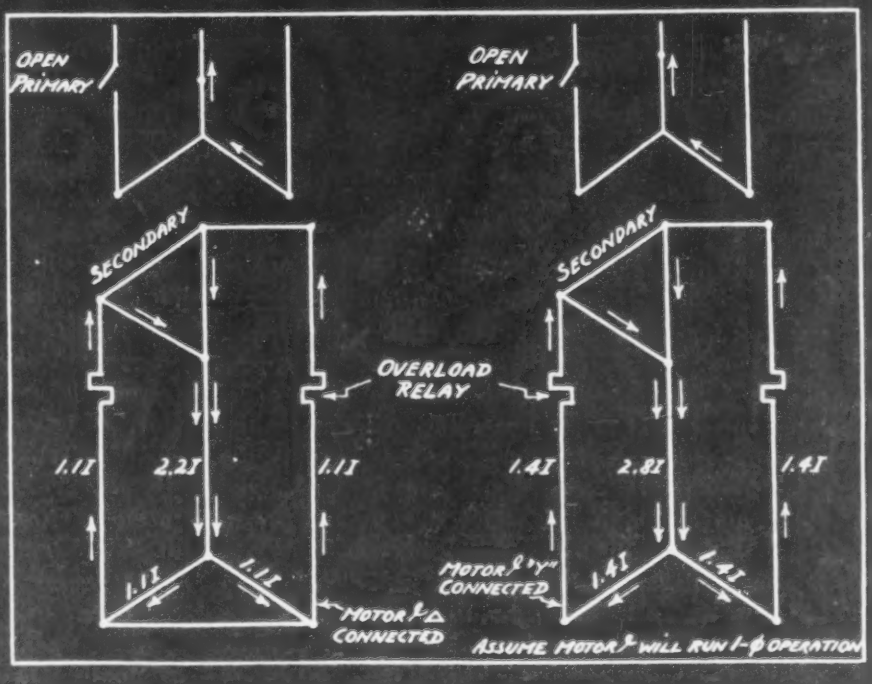
While it would seem that the probability of a motor failure is remote when a third overload relay is omitted from the installation, the fact is that many three-phase motors in agricultural pumping plants are seriously damaged due to excessive current in one or more of the phase windings. This is a matter of prime importance to the farmer because failure of his water supply at a critical time could cause the loss of a crop.

The cost of installing three-element protection is small, especially when compared to the cost of the average size pumping plant. A 15-hp., vertical shaft, motor driven deep well pump costs approximately $950 installed. For an additional expenditure of $8, representing the difference in cost between a three-element magnetic starter and a two-element device, complete protection for the installation can be secured. The cost differential is less than 1%.

In the case of three-phase motors already installed and provided with conventional two-element protection, "fusetrons" can be used in place of the usual type of cartridge fuse found in the entrance switch on the motor circuit. This may sometimes require the use of adapters for the "fusetrons." The cost of installing this form of protection will average $5, depending on the size of the motor. The "fusetrons" will provide an additional safeguard against ordinary overloads under normal operating conditions as well as protect against single-phase operation with a wye-delta transformer connection.

Portable equipment for demonstrating how the paralleling of connections affects motor operation has been devised for explaining the problem to motor dealers, contractors and pump servicing organizations in the PG and E territory. It consists of three 1-kw. transformers delta-wye connected, which can be energized by three-phase power from a 120-208-volt, four-wire secondary service. This provides a 4,000-volt primary similar to that used by the company. Three high-voltage fuse cutouts are installed in the primary line so that each line can be opened. Three additional 1-kw. wye-delta connected transformers give three-phase secondary power for the operation of a ¾-hp., 220-volt motor. The motor is equipped with a prony brake so that full load conditions can be obtained. The secondary circuit has an ammeter in each lead and is equipped with a standard combination 60-amp. switch and magnetic starter with the conventional two-element protection. This demonstration set-up permits a graphic and forceful illustration of the conditions under discussion.

Continued education of those responsible for motor upkeep and overhaul as well as the farm customer himself should ultimately result in correct protection procedure. When this occurs, there will be fewer service interruptions and fewer trouble calls.



These diagrams illustrate how a fault in one leg of the primary can result in current flow in all three phases of a three-phase motor circuit when wye-delta or delta-wye connection are used and the motor is provided with only two-element protection. If the fault was to occur in either of the other legs of the primary, the overload relays would give needed protection

ELECTRICAL WEST

McGRAW-HILL COMPANY OF CALIFORNIA
68 POST ST. SAN FRANCISCO 4

The all-industry magazine of progress, established 1887 and incorporating the "Electrical Journal," "Journal of Electricity, Power & Gas" and "Journal of Electricity." Contents Copyrighted.

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The Right to See

FOR years within the industry talk is all that has been done about lighting the highways. Everybody is for it but nothing is done about it. Within the industry the talk goes around and around and never comes out anywhere. Perfectionists hold back because there is no ideal highway lighting fixture or light source or pole or shielding. Utilities hold back because they fear the public will accuse them of making some money out of it. Highway departments possibly may be held back by the political pressure of cement, asphalt, heavy construction contractor, oil and gas interests.

Meanwhile, as Ralph Dorsey bluntly puts it, "we haul them away by the wagon load"—the victims of night accidents. As he likewise bluntly points out, take the same highway, the same people, the same crossings, the same or less traffic, same speed, and at the oncoming of darkness the accidents increase by three times. Further, he says, since the only difference in conditions is the ability to see, the public—both drivers and pedestrians—has a right to see.

Now a bill has been introduced in the California legislature for highway lighting and the Junior Chamber of Commerce has taken up the crusade for this "right to see." Surely it is time for the industry to forget its own petty perfectionistic bickering over the subject and support this move.

Why Ignore the Trolley Coach?

A SALESMAN outside our industry looking in on the electric power business would be amazed at the apparent lack of appreciation of the value of the trolley coach load. He would see two great industries that grew up together—the street railway business and the electric power business—gradually parting company, with urban mass transportation systems turning more and more to gas engine buses.

Why has not the whole electric industry, and specifically, the power companies, been more keenly alive to the possibilities of the trolley coach? Is it because they have failed to appraise the value of this load? Don't they care? Or is it politics?

If that same outsider were to dig down in search of the answer, likely he might find that the apparent lack of popularity of the trolley coach with some transit managements could be due to the placement of key men here and there whose obligations and loyalties lie with non-electrical special interests. He certainly would find, too, that if economy of operation and rider preference had been the deciding factors, the gasoline bus would never have made such inroads as it has on the urban mass transportation business.

Our outsider could make some further interesting discoveries. He would find, for instance, that Seattle, with its city-owned system, operates almost entirely with trolley coaches. He might overhear a visitor there remark that Seattle impresses one as the most up and coming city on the Coast in the handling of its transportation problem.

What would he discover in San Francisco? He would find a courageous mayor sincerely trying to untangle a bad snarl on the now fully city-owned lines. Ironically, he would find that, while the city is in a dilemma over disposal of its city-owned Hetch Hetchy power, it has men in its transportation branch who seem to favor gasoline-powered buses over electric-powered trolley coaches.

Down in Los Angeles, he might assume rightfully that the mass transportation system would seem to be a desirable and valuable load for the municipal power bureau. But with the transit lines reputedly dominated by manufacturing interests foreign to the electrical business, he could predict that the fumes from bus exhausts might soon rival the acrid fumes from the butadiene plant that aroused citizens last year.

While the electric industry, and particularly the power branch, has complacently gone about its business and has overlooked the fact that every trolley coach consumes an average of 205,000 kwh. annually (the equal of 105 electric ranges), it

would appear that the competition has moved into a strong position. Public demand, aroused by proper publicity, might soon change the attitude of the men in the mass transportation business who are standing in the way of the trolley coach.

Lesson in Semantics

AS one of the millions of Americans who have been misled by slogans, duped by artful phrases and tricked by politically pretty promises, we have a keen feeling for, and interest in semantics. (This is the science of saying what you mean and meaning what you say.) Hence we are more than passingly sympathetic with a study of terminology on the issue of business operation versus government operation of the electric light and power business conducted by EEI. For years the issue has been referred to as "public versus private ownership" when everyone knows that the public owns the property in either case. In the first instance, the ownership is through taxes paid to the government; in the second, it is through securities held direct or those owned by banks, insurance companies and the like.

The study points out that the issue is one of management, not ownership. In the case of "public ownership" so-called, the property is operated or managed by some department of the government—municipal, state or federal. Under "private ownership" the property is managed by business men appointed or elected by a board of directors. So to clarify the semantics of the issue, the EEI study recommends some specific and clear-cut terms to use in any description involving the issue. We concur heartily in the selections and promise (with some misgivings) to follow them in the columns of ELECTRICAL WEST. Here they are:

At no time should the term "ownership" be used in describing the issue.

The following terms are suggested and where more than one term is listed in the preferred column, the first choice is mentioned first:

DON'T SAY: private utility; private company; private ownership. DO SAY: electric company; business managed electric company; business managed company.

DON'T SAY: public ownership. DO SAY: government operation; government management; political management.

DON'T SAY: utility. DO SAY: electric company. Few customers use the word utility.

To distinguish other organizations in the electric field—operating under the "free" enterprise system SAY: electric manufacturer; electric manufacturing company; electric dealer; electric jobber; electric contractor; electric wholesaler.

DON'T SAY: privately owned industry in referring to the light and power business as a whole. DO SAY: the electric companies; the nation's electric companies; the electric companies of America; business managed electric companies.

DON'T SAY: publicly owned industry. DO SAY: the government projects and cooperatives. "Industry" usually is used to indicate a large company or group of companies operating under the American free enterprise system; it is not a proper term to apply to government operations.

DON'T SAY: private power. DO SAY: power generated by electric companies.

DON'T SAY: public power. DO SAY: power generated by government projects and cooperatives.

DON'T SAY: publicly owned plant. DO SAY: government power project; government project; municipal plant; rural electric cooperative; electric cooperative.

The EEI certainly is to be commended for this lesson in semantics. Now if the lesson can be learned and applied, the public will know what one issue is and what one industry means when it talks about it.

LEADERSHIP for business as one of the groups of our society, from the public relations standpoint, depends upon winning the support and goodwill of the forces that make up our society—farmers, labor, women, religion, education, the professions, social being, government and others, and on enlisting the support of the opinion moulders, the men and women who use the spoken or written word in the great channels of communication to the public. As forceful, socially minded, forward-looking leaders, business men can practice and publicize socially sound policies and practices—not only in business but in other fields as well. The great organizations of the country and the great media will listen to business and support business in such activities—not because business wants them to but because there is a coincidence on interest in what business is doing, with the public interest. American business men interested in preserving democracy and predominantly free enterprise, must exert this kind of leadership effectively. Leadership need not be left to articulate politicians, elected or selected government officials, editorial writers, educators, radio commentators or others. The crisis that faces us dare not be met by the hope that everything will be all right if we continue to muddle along, don't stick our necks out too much or pass the buck for leadership to others.—Edward L. Bernays, public relations counselor.

New RMEL Executive

Engineer to assist with acute utility problems

Consistent with new policies adopted by Rocky Mountain Electrical League, Floyd F. McCammon, president, has announced the appointment of Ralph B. Hubbard, an engineer and utility company executive, as a member of the league's staff.

Hubbard, recently elected president of the Colorado Society of Engineers, has been affiliated with Public Service Co. of Colorado for the past 25 years and, following his appointment to the league staff, requested, and was granted, a two-year leave of absence from his position as P. S. of Colorado's industrial development director. He will assume duties as manager of RMEL about April 1, according to reliable information.

The trend, said President McCammon, has been away from merchandising and promotional activities in recent years, and toward the engineering and electric utility emphasis which war conditions have imposed. As a consequence, league policy henceforth will be directed to solution of operational problems, and intensive study of relationships of private utilities with REA and regional federal power developments, such as the Colorado-Big Thompson River propect and the prospective Missouri Valley Administration.

"Our attention," McCammon declared, "will be directed to aiding in the prosecution of the war by lending all league facilities to the many activities in which power companies have played so important a part. We propose to develop adequate wiring and serve the unified interests of all utilities, including municipals, by planning for the postwar era; load building and labor problems are high on the agenda."

He called attention to the appointment of Fred Wiley, superintendent of utilities at Colorado Springs, as a member of the league's executive committee. This close relationship between private utilities and those owned by the communities in which they operate is an index to the united front which will be presented to federally controlled power developments in the Rocky Mountain region.

Hubbard, into whose hands the direction of league affairs will fall, is eminently qualified by experience to handle the job. A former member of the Colorado Scientific Society, he is now, in addition to being head of the Colorado engineers group, an official of the Denver Chamber of Commerce industrial relations committee and a member of the regional War Labor Board.

Ralph B. Hubbard

Utah League

At their recent annual meeting the members of the Electrical League of Utah elected Ora H. Barlow, Salt Lake district sales superintendent of the Mountain States Telephone & Telegraph Co., president for the coming year. He succeeds Kimball Vance, 1944 president. Other officers elected were: O. R. Bigelow, Paris Co., vice-president; George Herrod, Herrod and Co., Ogden, vice-president; J. F. McAllister, Utah Power & Light Co., secretary-treasurer; and George Nelson, Romney and Nelson, manager. Herrod is also chairman of the Ogden division.

Ora H. Barlow

State Licensing

A bill providing for licensing and bonding of those engaged in the sales of electrical wires, equipment devices and apparatus will be introduced in the Washington State Legislature under sponsorship of the Electric Club of Washington. The bill was prepared by a law firm under direction of William S. Gaunt, chairman of the Electric Club's legislative committee. Although sponsorship does not mean that the club will meet expenses, a committee was appointed by President Roger Walker to raise and distribute funds to help promote passage.

The bill in effect reads: "Relating to sales of electrical wires, equipment devices and apparatus, providing for the licensing and bonding of those engaged therein, prescribing the powers and duties of certain officials in connection therewith, providing penalties; and amending Chapter 169, 1935 Session, Laws of Washington."

In the same meeting at which it was voted to sponsor the legislation, the officers and trustees of the club discussed formation of a Tacoma chapter of the Electric Club of Washington and agreed to proceed immediately with such a plan.

Gaunt, business manager and financial secretary of Local 46 IBEW, will serve with the other directors for the two-year term. He tied with Grover Burke, City Electric & Fixture Co., in the recent election (EWEST November) and won the flip of the coin.

NWEL&P Engineers

The annual conference of engineers and operating men in the Northwest Electric Light & Power Assn., has been called by Harry M. Jones, Idaho Power Co., section chairman, at the Davenport Hotel, Spokane, March 27 and 28. E. H. Collins, Washington Water Power Co., is chairman of the arrangements committee.

In keeping with recent regulations regarding meetings and conferences, attendance will be kept down to fifty. Utility companies are asked to limit their delegations to two or three members, and manufacturers and jobbers to one or two.

Among the subjects selected for round-table discussion are: rural electrification; replacement of worn-out equipment; increasing the loading of existing apparatus; automatic operation and supervisory control; and forecasting load growth. Other subjects will be announced with the completion of the program just prior to the meeting.

To the THOUSANDS of Westinghouse
Appliance Dealers and Service People
who will attend the 1945
CONSERVICE TRAINING SCHOOLS

Wrapped up in a *fast moving* program will be everything needed to help you meet today's

STEPPED-UP SERVICE DEMANDS

Never was the service situation so critical as it is today. Practically all electric appliances are at least three years old. So, for the sake of home front morale, everything possible must be done to keep them on the job.

That's the whole purpose of the 1945 Conservice Training Schools. And the aim this year is to crowd the broadest and most thorough education into the fewest number of hours.

Accordingly, there are no frills to this program. From the sound of the morning bell it's all brass-tack demonstration and discussion.

This will be a two-day school with sessions running either consecutively or at separate times.

First Session Will Be Devoted to All Refrigeration Products

Domestic and commercial models, fixture applications, water coolers, Mobilaires and milk coolers will be thoroughly explained in this busy all-day session. A giant working model of a refrigeration control will be featured.

Second Session Will Cover Electric Ranges, Water Heaters and Laundry Equipment

Model by model, the various appliances in this group will be put through their paces. The laundry equipment discussion will be divided into two parts with ample time devoted to the care and maintenance of both the Laundromat and conventional washers.

New Operational Demonstration Boards Facilitate Diagnosis and Correction of Trouble

Interesting demonstration props are employed to explain operating fundamentals and facilitate diagnosis of difficulties. Thus, in true clinic fashion, service people see all problems set up and participate in their solution.

Dramatic 30-Minute Full Color Movie Shows How Good Service Builds Good Will

This informative film takes a serviceman through all the important steps that go to make a satisfied customer and a profitable service call. Packed into 30 minutes is more down-to-earth training than a newcomer could get in months of trial and error experience.

Check with Your Westinghouse Distributor for Dates of Meetings in Your Territory

The Westinghouse field service organization is all set to take to the road. Get the complete itinerary from your Westinghouse Appliance Distributor and make reservations for yourself as well as for your old and new service people.

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Appliance Division • *Plants in 25 Cities...Offices Everywhere* • Mansfield, O.

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ELECTRIC HOME APPLIANCES
YOUR PROMISE OF STILL FINER ONES TO COME

Tune in: John Charles Thomas, Sunday, 2:30 EWT., NBC. • Hear Ted Malone, Monday, Tuesday, Wednesday Evenings, Blue Network

Uniform Ordinance

Whether the inspectors association itself should be the sponsor of a uniform ordinance rather than an industry organization such as PCEA was essentially the question which drew the most discussion at the Jan. 31 meeting of the Southern California Chapter, International Association of Electrical Inspectors, at Laguna Beach, Calif. Jesse Ross, San Bernardino electrical inspector, chairman of the chapter, presided.

E. E. Larson, Riverside electrical inspector, president of the Southwestern Section, opened the subject as the "inspectors problem" of the day. He said a uniform electrical ordinance was the most important need for the region. M. Riddle, Pomona inspector, chairman of a special committee to prepare and promulgate such an ordinance for and by the inspectors told of meetings on the subject and was in doubt as to whether the IAEI would consider it a proper function of the chapter. It was decided to ask for a ruling from the IAEI as to whether active sponsorship of a model draft for an electrical inspection ordinance which may modify requirements of the National Electrical Code is permissible.

At the afternoon meeting H. C. Rice, manager of domestic sales, Southern California Edison Co., told of the educational work being done among the banks and lending agencies to get them to earmark sufficient funds for an adequate wiring installation. He told of the appraisal chart offered such agencies which calls for 4% for electric wiring. Elbert Kramer, Pacific Coast supervisor, Westinghouse Electric & Mfg. Co., gave an illustrated talk on *Electrical Living in 194X*, distributing the professional handbook on the subject.

L. W. Grayson, superintendent, Light Department, Riverside, talked of the problem of selecting leaded versus non-leaded cable sheaths.

The next meeting, in Alhambra, will be on March 21, and at the suggestion of R. H. Manahan the May meeting will be held in Long Beach, May 2, in order to discuss any last minute code changes before the Electrical Committee meeting in May to revise the 1940 Code.

● ANNUAL get-together dinner of the Greater Central Valley Chapter, International Assn. of Electrical Inspectors, was held in Sacramento Feb. 6. A. A. Tufford, field engineer, Allis-Chalmers Mfg. Co. in San Francisco, gave a short introductory talk to lead up to the showing of three motion pictures on steam turbines. The pictures were *Tornado in a Box*, *Magic of Steam* and *Surface Condensor*. About 50 members representing various branches of the industry were present and C. E. Jarvis, secretary-treasurer, declared it "an evening well-spent and it was suggested we hold them more often in the future."

Mountain Meetings

Because the meetings are small and are attended by members within the immediate radius, plans are going ahead for the three Rocky Mountain region's annual meetings of the Rocky Mountain, the Utah and the Montana chapters of the International Assn. of Electrical Inspectors.

Tentative dates are being arranged by the secretaries. Victor Moulton of the Rocky Mountain, Denver, C. F. Grant, secretary of the Utah Chapter and James G. Clune, secretary, Montana Chapter and Victor H. Tousley, secretary IAEI. The Rocky Mountain Chapter will hold its meeting Thursday and Friday, April 5 and 6, Utah Chapter Monday and Tuesday, April 9 and 10 and Montana Chapter Friday and Saturday, April 13 and 14. The exact meeting place has not yet been announced.

No. Cal. Inspectors

The adequate wiring talk and demonstration presented by Jared A. Hill, Pacific Gas and Electric Co., before the Home Planning Institutes of northern California was submitted to the electrical inspectors at the Northern California Chapter, IAEI meeting, Feb. 14 at Pacific Gas and Electric Co. building, San Francisco.

Following this demonstration and presentation, Harold L. Gerber, chief inspector, Department of Electricity, San Francisco and secretary-treasurer of the chapter, gave answers to four questions which had been announced on the meeting notice. These dealt with insulated conductor for the ungrounded conductor in the raceway of an overhead service, number of conductors in a raceway where the conductors are type SN, necessity for an inspection port in fluorescent lighting fixtures, and the difference in wiring requirements between high-voltage sign and outline lighting and cold-cathode interior illumination.

Chairman H. C. Romick, San Francisco, appointed E. H. Snedaker, San Jose, N. J. Siggins, San Francisco, and B. C. Hill, Oakland as the nominating committee to report at the next meeting which will be held at San Francisco in June or July. Attendance at the meeting was 72.

Radio Ordinance

Northern California Bureau unit opposes proposition

Met to consider the effect of a proposed ordinance, revising the sales control ordinance of the City of San Francisco and adding to it provisions for examination, licensing and control of radio service men and service shops, the San Francisco unit of the Northern California Electrical Bureau held a special meeting Feb. 16 at the Western Merchandise Mart. Peter Saxe, Sterling Furniture Co., president and the newly re-elected officers and directors had the meeting in charge.

Walter Newman, Charles Brown & Sons, Al Meyer of Leo J. Meyberg Co., Kenneth Ryals, Stone-Ryals Electric Co., electrical contractors and representing the San Francisco Electrical Contractors' Assn., George W. Fitch, managing director Retail Furniture Assn. and Lloyd Taylor, representing the Market Street Merchants' Assn., talked on the ordinance.

In the form in which it was originally presented, the discussion indicated, there were many things to which the merchants objected and it was suggested that not only would the unit oppose the passage of the ordinance but that it would seek to make recommendations for adequate legislation in cooperation with the Radio Technicians' Assn., which had presented the ordinance to the supervisors. It was felt that some type of regulation was necessary to qualify radio technicians and to prevent flagrant abuses of repairs to radio and electronic equipment by unqualified persons recently entering the business.

The meeting was opened with election of officers and by the presentation of *The Dream Home of the Future* by William A. Cyr, Associate Editor, ELECTRICAL WEST. Officers elected for the ensuing year are as follows:

Peter Saxe, Sterling Furniture Co., president; H. Conrad, Shirar Young Co., vice-president; C. P. McCarthy, Pacific Gas and Electric Co., secretary-treasurer; Clyde Allen, Graybar Electric Co.; John N. Barker, Westinghouse Electric Supply Co.; Everett Carlson, Central Electric Co.; C. W. Caulkins, Thompson & Holmes; C. A. Dahl, G. E. Supply Corp.; Ed Dowd, Dowd-Seid Electric Co.; Henry Gilmore, McNally Appliance Co.; Jack Hickey, Jack Hickey; Roy Hurd, Hale Bros.; Ed Lachman, Lachman Bros.; Wm. Lancaster, Leo J. Meyberg Co.; W. J. Lee, Sherman, Clay & Co.; J. H. Lindenmayer, The Emporium; Guido Menicucci, Arc Electric Co.; M. P. Meyer, Nathan-Dohrmann Co.; Charles Redlick, Redlick Newman Co.; Wm. Riley, Riley Haight Hardware Co.; Perry M. Spencer, Frank Newman Co.; L. D. Stull, Apex-Rotarex Mfg. Co.; Frank Talcott, Pacific Gas & Electric Co.; J. T. Templeton, H. R. Basford Co.; Philip A. Wood, J. H. Wiley Co.

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REAL Protection

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After the demands of war are satisfied, you'll be able to get all the rigid steel conduit you want. Your distributor will have Youngstown BUCKEYE CONDUIT in stock again -- in all the sizes and quantities you'll need.

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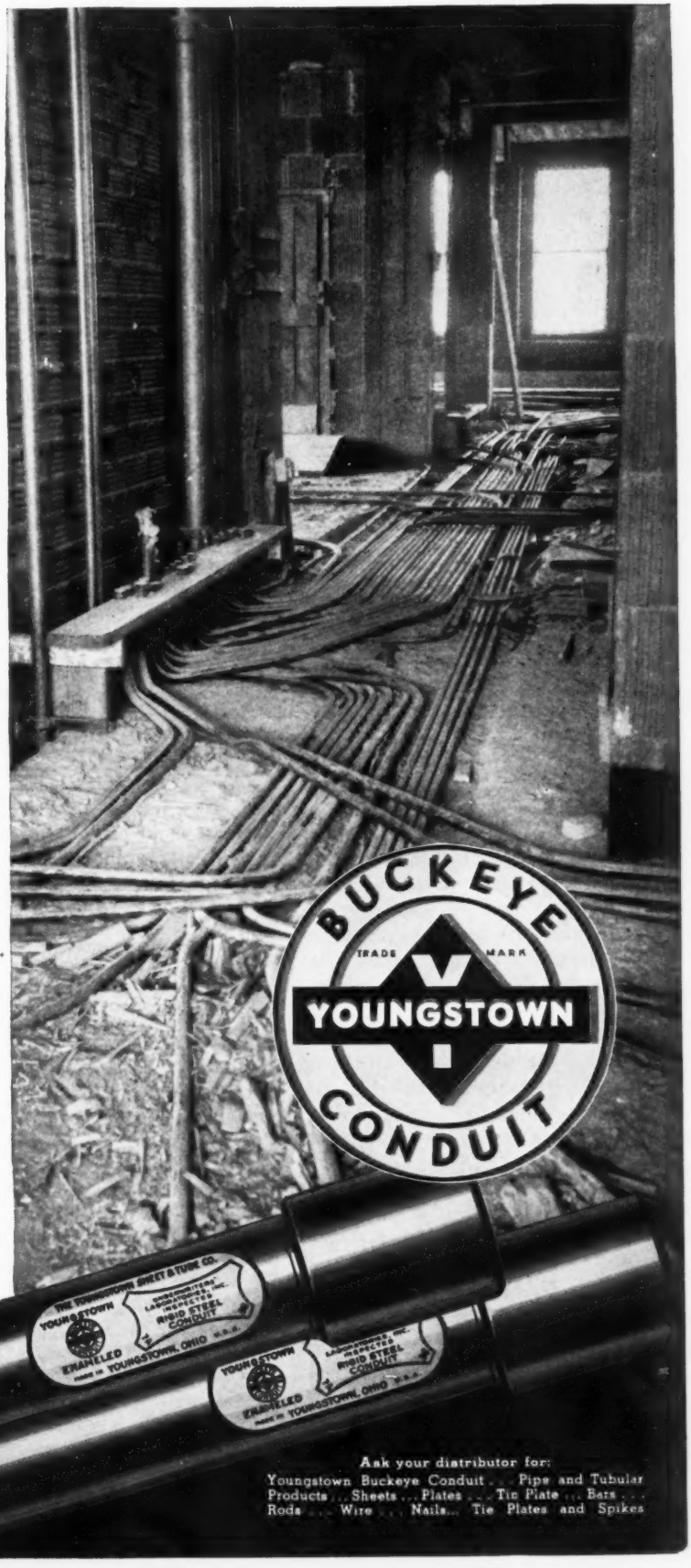

Right - This upper floor remained unfinished for several years. The rigid steel conduit afforded vital protection to wiring, against careless workmen and intruders.

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Youngstown Buckeye Conduit . . . Pipe and Tubular Products . . . Sheets . . . Plates . . . Tin Plate . . . Bars . . . Rods . . . Wire . . . Nails . . . Tie Plates and Spikes

PCEA Panorama — Edited by Mary Shoop

You and Joe And His Job

PUBLISHED by the Pacific Coast Electrical Assn. as a contribution to the war effort and the peace which is to follow, the booklet, *You and Joe and His Job*, is receiving widespread notice and approval throughout the United States.

Devoted to the moral and legal obligations of employers to the returning Veterans of World War II, the booklet contains concrete suggestions to management and a compilation of laws and rulings pertaining to veteran employment. Its 60 pages detail the duties and responsibilities of management in respect to employees on military leave of absence, presents a program whereby employers may keep in touch with each employee during his absence and gives human interest examples of what a few companies are doing to reassure such employees concerning their status after their return to civilian life.

Written by management for management, the book was sent to top executives of 5,000 of the largest employers in the United States, who are finding it of great assistance in postwar employment planning.

Credit for *You and Joe and His Job* goes to Hance H. Cleland, president of PCEA. The idea was his and the book was not only produced under his supervision but most of it was assembled or written by him personally. As president of San Diego Gas & Electric Co., Cleland has devoted a great deal of attention to fulfilling the company's obligations to service men, and under his direction, the company has attained a position of leadership in this field. His interest in this important matter led to the production of the PCEA booklet to carry information and inspiration to other executives throughout the nation.

Under the auspices of PCEA's publicity committee, the booklet was given publicity in numerous newspapers and magazines, and a selected number of editors received copies. As a result of this notice, requests for hundreds of individual copies were received, and a number of organizations have purchased quantities for distribution to their executives, superintendents and department heads.

Following release of information about the booklet, numerous requests came from people wanting to send copies to relatives and friends in the service. It was necessary to deny these requests as the booklet does not deal with employment from the service man's angle, but rather, is intended solely for the use and guidance of management in meeting this serious problem of re-absorbing into company organizations, employees returning from military service.

Inquiries concerning the booklet should be addressed to Hance H. Cleland, Electric Bldg., P.O. Box 1831, San Diego 12, Calif.

Electriquiz

1. What is the world's most powerful X-ray unit?
2. How much horsepower does the average U. S. factory worker have at his command?
3. What is the trend in lighting costs?
4. Who invented the germicidal lamp?

See page 111 for answers.

Membership Grows

The wartime need for interchange of ideas with others in the industry is appreciated more than ever, as shown by the results of PCEA's membership campaign for the 1945 year. Within the first month after the beginning of the drive, more than 90% of former members had renewed, and 20 new companies had come into the association fold.

Credit for these excellent results goes to the hard working membership committee, of which S. W. Scarfe, General Electric Co., Los Angeles is chairman and E. A. Long of PG and E, San Francisco, is vice-chairman. Members are Herbert Atwater, Leo J. Meyberg, San Francisco; H. F. Hartzell, Maydwell-Hartzell Co., San Francisco; B. M. Tassie, G-E, San Francisco; E. J. Duggan, San Francisco; Arthur Dahl, G-E Supply Co., San Francisco; R. E. Robertson, Frigidaire Division, General Motor Sales Corp., San Francisco; Walter H. Thompson, Westinghouse Lamp Division, San Francisco; R. F. Gheen, Ohio Brass Co., Los Angeles; R. N. Phelan, McGraw-Hill Co., Los Angeles; R. A. Hopkins, Westinghouse Electric and Supply Co., Los Angeles; T. T. Kennedy, Okonite Co., Los Angeles; L. G. Peck, California Electric Power Co., Riverside; J. W. Swank, Southern California Edison Co., Los Angeles; S. R. Robinson, San Diego Gas & Electric Co.

Who Am I?

I was born in Boseman, Mont., March 7, 1890. After attending Irving Grade School and Gallatin County High School at Bozeman, I enrolled at Montana State College and was graduated with a B.S. degree in electrical engineering in 1913. I received my master's degree in electrical engineering in 1916. Who am I?

On July 23, 1913, I was employed by the Westinghouse Electric and Mfg. Co. as a graduate student at East Pittsburgh, Pa., after which I was regularly employed in the mining section of the industrial department, until 1916, when I came to Los Angeles as a cub salesman. The next year I was transferred to Arizona as industrial salesman, with headquarters at Tucson. On Jan. 1, 1925, I was made manager of the Arizona branch office, moving to Phoenix. I remained there until April 1, 1943, when I became Los Angeles manager. Who am I?

I am a director of the Pacific Coast Electrical Assn., member of the executive board of the Los Angeles Electric Club, a member of AIEE and the California Club. My hobbies are golf and fishing. I am married, have one daughter, reside in Los Angeles, and my name is: See page 111.

Conference Dates Set

According to present indications, the 1945 PCEA spring conferences will be among the most interesting and valuable ever held. The guidance committees of the three sections of the association are hard a work on a program that will present subjects of especial wartime importance, and nationally prominent speakers in the industry.

Dates for the conferences are June 21, Los Angeles, for southern members; June 28, San Francisco, for northern members.

By holding one day regional meetings, the association avoids excess demands on hotel accommodations and public transportation, where congestion led to the Office of Defense Transportation's ban on wartime conventions. Practically all who will attend the PCEA conferences will come from home and return the same day, "sharing the ride" with others from the same area.

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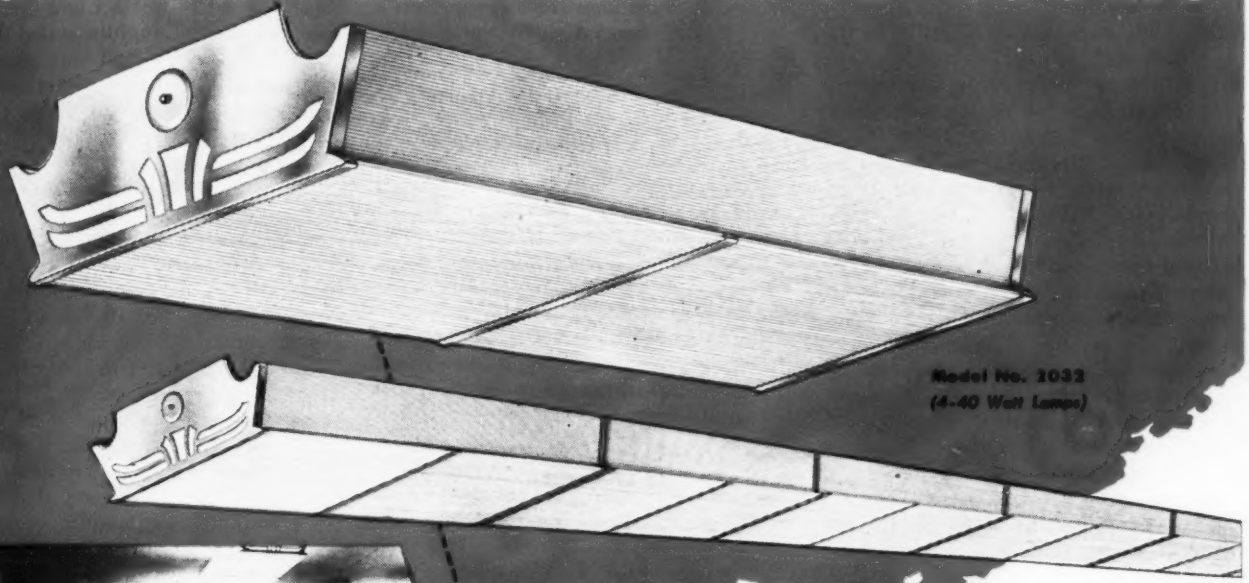
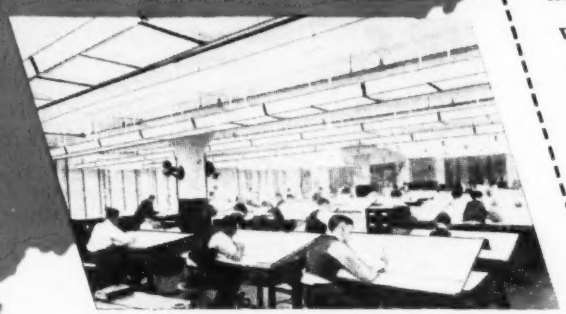


Mitchell U.R.C. Luminaires relieve eye strain, increase ease of work and contribute to comfort of employees.



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HIGH INTENSITY ILLUMINATION WITH LOWEST SURFACE BRIGHTNESS

This is the *original* U.R.C. fluorescent fixture that revolutionized commercial lighting from the day it was first introduced by MITCHELL. This is the unit that brought new lighting efficiency and comfort to office work by combining maximum light output with minimum glare (surface brightness). It is adaptable for every type of interior—pendant or surface mounting, individual or continuous row. Takes less time to install than any other commercial fixture. Same low original price!

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NEWS of the industry

OREGON TOWN TURNS DOWN COOPERATIVE FRANCHISE

Citizens of Salem, Ore. on Feb. 9 rejected by 83 votes application of the Salem Electric Cooperative Assn. for a ten-year franchise. Vote was 2366 to 2283, with approximately 30% of the electorate balloting.

Facilities of the co-op duplicate those of Portland General Electric Co., which serves the area. Formed in 1938, the co-op started its construction activities two years later, when by night it set seven poles within the city's boundaries. Protest from city officials stopped the work, but subsequently the Salem Common Council granted the association permission to set 20 poles in all.

A citizens' committee appointed by the mayor to study the city's power problem advised against allowing the duplication of service, citing Dr. Paul Raver and others on the economic waste resulting from such duplication.

Despite opposition, however, the co-op in February 1942 began installation of a lead-covered cable across the Willamette River and in March energized its lines for the first time, using Bonneville power. During 1944, the co-op took delivery of 246,720 kwh. from Bonneville. PGE took 20,058,000 kwh. of Bonneville power during the same period.

Washington Court Extends Injunction in PUD Case

Plans of Okanogan (Wash.) PUD to proceed with acquisition of Washington Water Power Co. properties in the county were interrupted last month, when the state supreme court extended until March 30 an injunction against the district's proposed bond issue to finance the purchase. Extension was requested by the power company and citizens of the county.

Legality of the proposed bond issue was expected to be determined by a supreme court hearing sometime in March. At issue is the power of the PUD commissioners to vote an increase in the bond issue amount to raise 500,000 in excess of the $2,227,531 valuation placed on the utility properties by a county jury in January 1943.

Meanwhile Washington Water Power Co. has filed suit in superior court to determine if it must sell power wholesale to the district. The PUD is not subject to state or federal utility regulation and therefore is not a utility, the company contends, and it never has been required to sell electricity wholesale for resale to its own customers.

Postponed indefinitely pending supreme court decision is a hearing, originally scheduled for January, on a decree of appropriation by the district.

Bonneville Cancels PUD Contract At Yakima

On grounds that the district had failed to function, Bonneville Power Administration last month canceled its contract with Yakima County (Wash.) PUD. The contract was signed in 1941.

Commenting on the action, Dr. Paul Raver, Bonneville Administrator, said it was prompted by failure of the PUD to comply with agreement terms, which specified that the district should acquire or construct an electric transmission and distribution system to be operated on an efficient and economical basis.

Raver said that the cancellation was ordered only after each member of the PUD commission had "definitely committed himself as being opposed to the fundamental principles of public operation of power distribution facilities and had informed Bonneville's representatives that no plans had been made for getting the district into actual operation."

He added that, if the PUD district or any other public body within the terms of the Bonneville Act decides to serve the area, "we stand ready to discuss a power contract to supply its needs."

The Yakima area is served by Pacific Power & Light Co.

● UNDER a ruling from the attorney-general's office in Olympia, Wash., in an opinion asked for by the Department of Public Service, a privately owned electric public utility has the duty to sell current to a municipal corporation for redistribution and re-sale, even though the latter has acquired its distribution properties by condemning those of the privately owned utility.

● AN ECONOMIC SURVEY of Walla Walla County (Wash.) has been completed by the Bonneville Administration as another in its series to determine future power markets in the Northwest. Doubling of truck crops in the valley through additional irrigation is foreseen in the report.

NO PURCHASE OFFER MADE, UTILITY PRESIDENT SAYS

Commenting last month on the proposal of Guy C. Myers, New York banker, to purchase properties of Puget Sound Power & Light Co., President Frank McLaughlin stated that no purchase proposal had been placed before him and that he had not agreed to negotiation with anyone. He further stated that he would place nothing before the company's stockholders until such time as a bona fide proposal had been submitted.

Myers asked for and received fiscal data concerning the company's operations. Purchase, if consummated, would be for resale to PUDs in western Washington.

According to Bernard Pearce, executive secretary of the PUD Information League of Washington, Myers has been authorized by eastern Washington PUDs to submit a purchase offer to Washington Water Power also.

Prominent in public ownership financing plans in the Northwest, Myers conceived the $175,000,000 Hood River PUD plan defeated last year, and was heard of recently in connection with the Clark County PUD activities.

Oregon PUD Asks Permit to Build Distribution Lines

Franchise permitting construction of facilities to distribute Bonneville power has been requested in county court by the Wasco County (Ore.) PUD. The county, which includes The Dalles, is served by Pacific Power & Light Co., which has informed PUD officials that it will not sell its properties in whole or part.

PUD applications for a franchise to set up a competing utility system have been turned down twice by The Dalles city council and public power plans have been defeated at several elections.

According to Charles Foster, PUD chairman, if the franchise is granted the district will use $475,000 in bonds voted when it was created, to install an underground transmission system.

In a meeting with PUD officials at which he told of his company's decision not to sell, Paul B. McKee, P. & L president, said the group has a legal and equitable means of acquisition through condemnation and suggested that the PUD board employ engineers to make a valuation.

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"which fuse is blown?"
"A.C. or D.C.?"
"what voltage?"

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CLARK COUNTY PUD STARTS CONDEMNATION ACTION

Following its resolution to start action to acquire private power facilities in Clark County, Wash. (EWEST February), Clark County PUD filed suit in superior court Feb. 5, against Portland General Electric Co. Condemnation proceedings against Northwestern Electric and Pacific Power & Light companies were to follow.

In a counter action, PGE asked that the preliminary proceedings be transferred from the court at Vancouver to federal court at Tacoma. The change was sought on grounds that the defendant company is not a Washington corporation.

State Bill Would Relax PUD Property Sale Provisions

An amendatory proposal to enable PUDs to sell or lease their properties to any district, city or other public agency without a public vote was introduced in the Washington State Legislature by George F. Yantis, house speaker.

Two-thirds affirmative vote of electors still would be required for sale to private sources. According to Yantis, the proposal is not another Initiative 12, but a clarification of an authority intended in the original PUD act of 1931. It provides also for appointment of trustees, depositaries and paying agents to handle revenues derived from operation of PUDs.

Electric Cooperative Act Shelved By Idaho Senate

An electric cooperative act was shelved indefinitely by the Idaho Senate recently after opponents had argued it would jeopardize the state's water rights.

In moving for postponement of the act, Senator J. Elmer Williams (R) contended that it would give REA cooperatives the right to erect dams and impound water, irrespective of Idaho laws. Senator Williams pointed out that the act was tied in with a bill to create nine regional authorities (similar to the Tennessee Valley Authority) which has been introduced in the national house of representatives.

● OFFER of Gordon Kerr to install and operate a light and power plant at Terrace, B. C., to serve the village and immediate surrounding district, has been accepted by Terrace rate payers. Due to wartime activities, this area has increased in population from 500 to over 2,000 in the past two years.

The accumulated experience of 35 years of four-wheel-drive leadership is embodied in this FWD Model HAR . . . a truck endorsed by owners, in just four years, to the extent of 50 million dollars in purchases.

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Like all FWDs in the complete range from 2½ to 15-ton trucks, the FWD model HAR commands the respect of all who know quality. Its fine appearance speaks for superior power, ruggedness, performance without waste, and ability to HAUL LONGER FOR LESS!

Figure less depreciation, more years, more mileage for FWDs. Figure less upkeep and operating costs. Balanced weight distribution and the four-wheel-drive principle reduce driving strain 50% on each axle. Figure less tire cost . . . equalized power distribution and balanced load on all four wheels prevent the slips, skids, slues and scuffs that tear down tires. Figure less fuel cost . . . 88.2% of engine power goes to move payloads . . . with power in all four wheels. Figure less cost-per-ton-mile . . . wide range of gear ratios and FWD traction on all wheels permit more speed on hills, curves and tough roads. ☆ Figure FWDs in the future, too, to haul longer for less.

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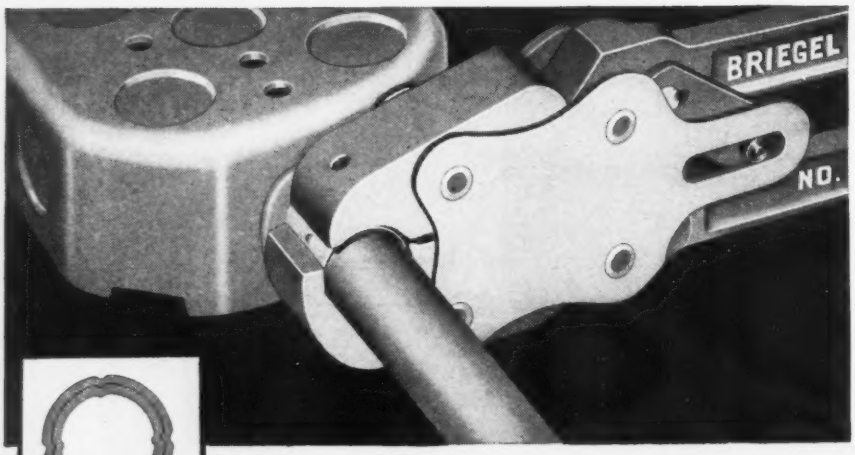
THE ORIGINAL EXCLUSIVE BUILDERS OF FOUR-WHEEL-DRIVE TRUCKS



Cross section Showing Indentations.

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SAN FRANCISCO GETS NEW STAY OF RAKER ACT

A new stay of execution delaying enforcement of the Raker Act until July 1 was granted the city of San Francisco by Federal Judge Michael J. Roche on Feb. 25. Effective date on which the city was to discontinue sale to Pacific Gas and Electric Co. had been March 1.

The extension was agreed to by Arthur J. Goldschmidt, chief of the Interior Department power branch. It was granted, according to the court, in order that San Francisco might have an opportunity of working out an "orderly system" for compliance with the act.

San Francisco officials again took the issue into federal court following collapse of negotiations in Washington, D. C., between Mayor Roger Lapham and Secretary of the Interior Ickes.

During the negotiations, Ickes was reported to have demanded that the mayor again submit to the voters the question of municipal ownership of the city's power distribution system and that he personally support passage. Next step was to be a vote on a bond issue for purchase of PG and E's system within the city, a proposal which has been turned down repeatedly in the past. Lapham reportedly agreed to submit the public ownership issue but refused to campaign for it.

In submitting the matter again to the courts, the city had asked permission to continue to sell Hetch Hetchy power to PG and E until July 1, 1946, and asked that it be allowed to continue to sell "dump" power to the private company even after other disposal has been made of the bulk of the output.

Called as a witness for the city, Lapham testified that San Francisco is engaged in negotiations for sale of the power to Turlock and Modesto Irrigation districts and the two Kaiser-owned Permanente plants near San Jose. He stated that peremptory cancellation of the PG and E contracts would cost the city $1,250,000 the first year and would result in an increase of 16 to 17 cents in the city's tax rate.

City officials had disclosed previously that the Riverbank, Calif., aluminum plant, which formerly purchased $2,400,000 worth of the power annually, might reopen to engage in manufacture of other war products.

● INCREASING VANDALISM is indicated in reports from the Seattle City Light Department that during 1944, there were 6,563 lights broken on the city streets, as compared with 5,044 during the previous year.

EVER THINK OF A FLUORESCENT TROFFER LIGHTING SYSTEM AS A STRUCTURAL AID ?

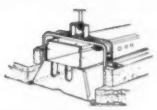
In designing stores, offices, schools and public buildings...

lighting is no longer a comparative afterthought. It is an integral part of the design and construction, and—in the case of Miller Fluorescent Troffer Lighting Systems—*is a definite structural aid!*

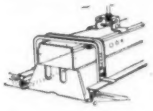
For instance, it is no longer necessary to block in a ceiling and then waste expensive hours cutting, adjusting and readjusting until the fixtures fit and hang as intended.

Instead, Miller Fluorescent Troffer Lighting Systems hang directly from the structural ceiling —and the false ceiling, which is hung from the lighting system, can be quickly filled in.

This patented Miller Bracket makes it possible:



Miller Bracket for wood-frame ceilings.



Miller Bracket for metal-frame ceilings.

Other structural aids include: Reduction of 50 to 75% in needed supports from structural ceiling . . . outlet movement minimized or eliminated . . . conduit and conduit fitting costs reduced up to 80% . . . wiring costs reduced up to 50%. And they all combine to make Miller Fluorescent Lighting Systems the most practicable to install.

And the most *flexible* for esthetic design and functional planning!

Miller Troffers fit the picture as single units or in blocks, geometric patterns and even as light strips "by the mile." Their wide range of plastic and glass lenses, plates, and metal or plastic grilles harmonize with any type interior.

In fact, so versatile are Miller Fluorescent Troffer Lighting Systems that they *suggest* themes around which entire interiors may be planned.

So call a Miller Representative (they're in principal cities) and see how our 100 years experience with all proven light sources can serve you!

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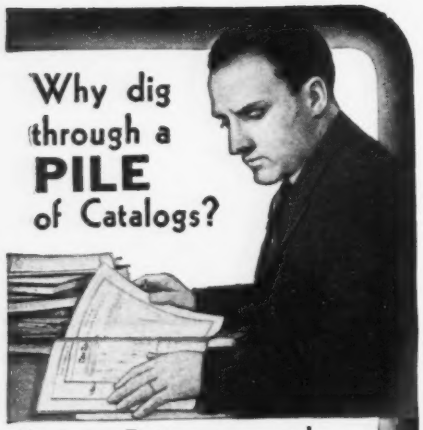

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Universal Clamps to take a large range of conductor sizes; with 1, 2, 3, 4 or more bolts.

L-M Elbows, with compression units giving a dependable grip on both conductors. Also Straight Connectors and Tees with same contact units.

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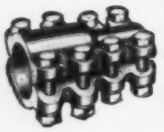

Jack-Knife connectors for simple and easy disconnection of motor leads, etc. Spring action — self locking.

Vi-Tite Terminals for quick installation and easy taping. Also sleeve type terminals, screw type, shrink fit, etc. etc.

Splicing Sleeves, Figure 8 and Oval, seamless tubing—also split tinned sleeves. High conductivity copper; close dimensions.

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COPCO ASKS PERMIT FOR POSTWAR DEVELOPMENT

Preliminary permits for postwar development of a hydroelectric plant on the North Umpqua River in Oregon have been applied for by the California Oregon Power Co., it was announced early last month. Cost of the proposed project was placed at about $4,000,000.

Copco has wanted to install a dam on the North Umpqua for many years, but the company has deferred to objections that a barrier would interfere with fish migration. The proposed 35-ft. dam would be installed near Toketee Falls, an existing natural barrier to fish migration.

Plans call for the diversion of about 1,200 sec. ft. of water through a 7,600-ft. tunnel to the mouth of Slide Creek, giving a 415-ft. head capable of developing upwards of 54,000 hp. A 40-mile transmission line would feed power into the Copco system at Dixonville, six miles east of Roseburg, Ore.

Application for permission to proceed with survey and design was made to the Oregon State Hydroelectric Commission and the Federal Power Commission.

Plans Going Forward For Hungry Horse Project

Plans and specifications for Hungry Horse Dam, $40,000,000 key unit in a long-range program for full development of the Columbia River and its tributaries, will be brought to the point where bids can be issued immediately after the war, the Bureau of Reclamation announced recently as pre-construction work was slated to begin.

To be located on the South Fork of the Flathead River above Kalispell, Mont., the dam is expected to increase by about 78,000 kw. firm power capacities of existing downstream power plants at Polson and Thompson Falls, Mont., and at Grand Coulee, Rock Island and Bonneville dams on the main Columbia. The dam will also provide 1,500,000 acre-ft. of live storage for irrigation, flood control and improvement of navigation.

Pre-construction work includes surveying for a power line and on site power development, it was reported. Reclamation Bureau officials have estimated Hungry Horse would add 284,000 kw. to the firm power capacities of power plants likely to be installed downstream as part of contemplated postwar development.

● FURTHER PROGRESS is being made by the West Canadian Hydro Electric Corp. Ltd. in connection with its plans for erection of a large new substation at Vernon, B. C. Site for the new plant has been purchased from the City of Vernon at Mahon and Prince streets. While full details of the technical equipment of the new station have not been completed, it is known that it will have three circuits with provision for installation of additional service at a later date. The capacity will be approximately two and a half times that of the company's existing substation at Vernon. The industrial load will be carried on separate circuits from those feeding residential and business areas.

Anderson Dam Past Halfway Point, USBR Official Says

Anderson Dam, key unit in the USBR development plan in southwestern Idaho, was 55% complete at the end of 1944, according to H. F. Bahmeier, construction engineer. The dam is a multiple-purpose project, for irrigation, flood control and power.

During 1944 1,600,000 cu. yd. of earth and rock were added to the structure, which, when completed, will contain 9,000,000 cu. yd. of material. Height above bedrock was increased to 250 ft., more than half the ultimate height.

Construction schedule for 1945 calls for placement of an additional 3,000,000 cu. yd. of earth and rock, completion of the intake structure for the outlet works and initial work on the spillway. It is estimated that 45,000 acre-ft. of water can be stored for the 1946 growing season.

New Line From Boulder Dam Authorized in Washington

Authorization for the construction of a new 130-mile high-voltage transmission line, at a cost of $4,500,000, to carry electricity from Boulder Dam facilities to southern California, has been issued by official Washington, it was announced in Los Angeles Feb. 22 by Louis M. Dreves, chairman of the Area Urgency Production Committee.

Dreves stated that when the line is completed, it will carry 220,000 volts current of Boulder Dam power for use in Los Angeles, San Diego and other southern California cities and towns. Between six and seven months will be required for construction of the line.

It was estimated by Dreves that the additional electric power will result in a saving of at least 1,000,000 bbl. of oil now used in steam plants to generate electricity during peak demand periods.

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CENTRAL RIGID STEEL CONDUIT

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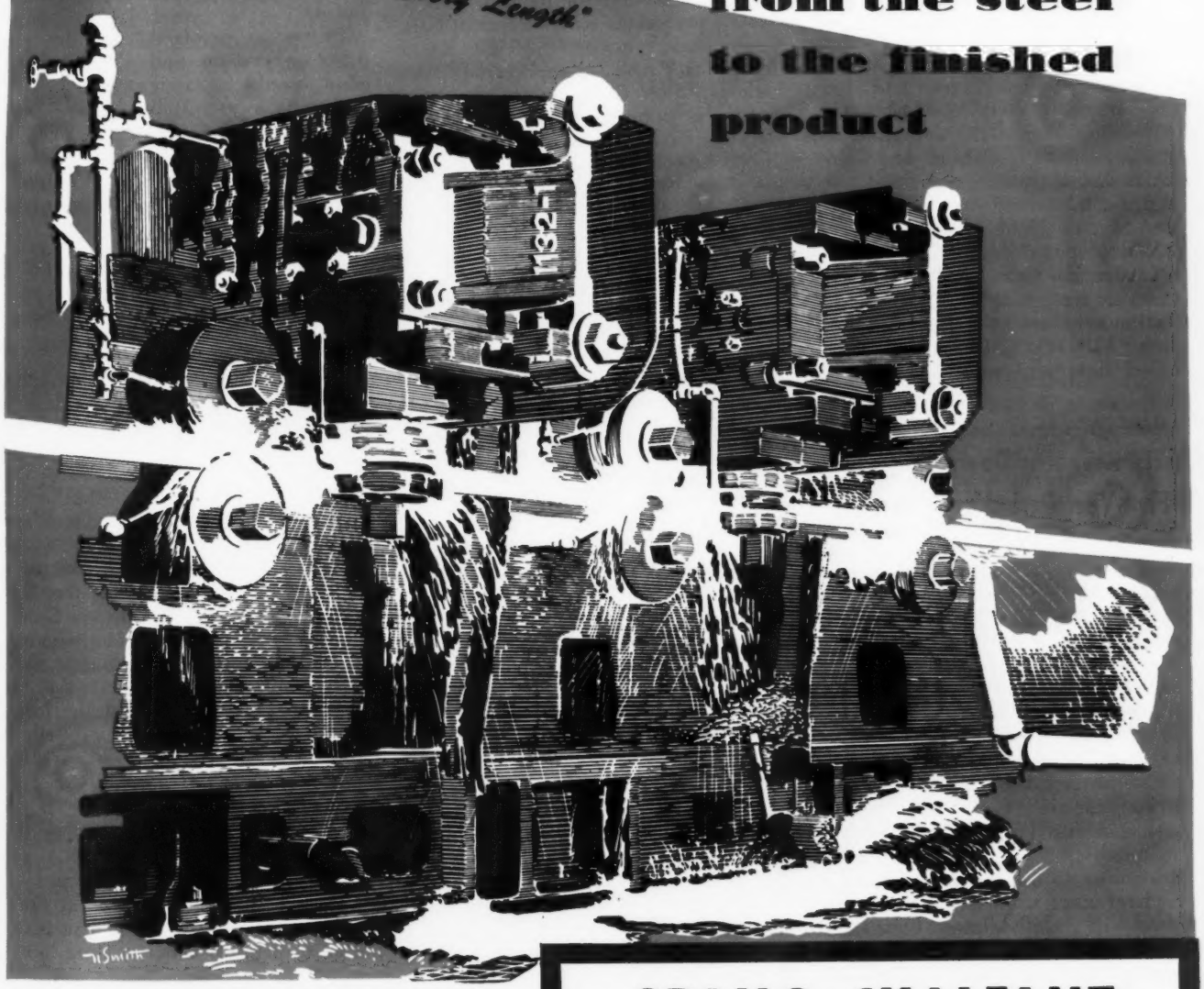

Ingeniously designed welding rolls where the white hot skelp is accurately shaped and securely welded into pipe immediately after it emerges from the furnace. It is from this quality controlled pipe that Central Conduit is made.

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BONNEVILLE REPORTS PLANS FOR REGIONAL DEVELOPMENT

A program of unified regional development to insure the best possible utilization of the Pacific Northwest's natural resources was advocated in the Bonneville Power Administration annual report, submitted by Administrator Paul J. Raver to Secretary Ickes late in February.

To this end, Raver stated, Bonneville has coordinated its program for future development with the advance program report outlined by Northwest States Development Assn., composed of governors of Oregon, Washington, Idaho, Montana and Wyoming. The combined program calls for immediate postwar construction in the Columbia Basin to cost $700,000,000 and to include multiple-purpose projects and power transmission facilities.

Projects listed include Hungry Horse Dam in Montana, the Cabinet Gorge and Albeni Falls projects in northern Idaho, the Foster Creek and four Snake River projects in Washington, the Umatilla Dam on the Columbia, the Detroit project in Oregon and other irrigation, navigation and flood control projects.

In order that it may integrate existing and proposed dams and load centers in a region-wide transmission grid, Bonneville has set up an advance construction program calling for approximately $100,000,000 in new transmission lines and substations, Raver stated.

Utility Revenues Down In Five-Year Period

Despite a 42% increase in gross revenues, net revenues of the five largest ivately owned electric utilities in alifornia decreased 4% in the five-year period from 1939 to 1944, it was reported to the California Railroad Commission by Charles W. Mors, research engineer of the commission's public utilities department. Included were Pacific Gas and Electric, Southern California Edison, Coast Counties Gas and Electric, California Electric Power and San Diego Gas & Electric companies.

According to the report, during the period revenues from electric sales increased 40%, while kilowatt-hour sales increased 71%. The smaller increase in revenue was said to reflect the addition of a large amount of low-rate industrial power, together with rate reductions aggregating $8,000,000, on an annual basis, since mid 1939.

Production and sales increased considerably more than did system peak loads, particularly on the San Diego and Edison systems, a fact which was attributed to higher proportion of industrial load and conversion of many plants to two- or three-shift operation.

Percentage increase of taxes paid by the companies during the period outstripped the percentage increase from sales of revenue four to one, Mors reported. Change in disposition of the revenue dollar were reflected in a comparison for 1939 and 1944 which was as follows:

Item	Year 1939	12 Months Ended Nov. 30, 1944
Operating expenses	30.0c	31.5c
Taxes	16.6	31.3
Depreciation and return	53.4	37.2
Total	100.0	100.0

Water Association Asks Hydroelectric Development

License to develop its own hydroelectric project on Kings River in California was requested by the Kings River Water Assn. in application to the Federal Power Commission. The association is opposed to the Bureau of Reclamation program for construction of the $19,000,000 Pine Flat Dam on the river.

Composed of 19 irrigation districts taking water from the river, the association seeks to develop a $34,000,000 project to provide 115,000 hp. at peak efficiency. The already authorized dam at Pine Flat would be part of the association's proposed project of three dams, four power plants and connecting tunnels.

Application for right to use irrigation water for power development was filed at the same time with the California Division of Water Resources, it was announced. Power would be used for irrigation and industrial and domestic service within the area.

● PURCHASE of all stock of Northern Light & Power Co., Garberville, Calif., by the Pacific Gas & Electric Co. for $83,934 and dissolution of Northern Light recently was authorized by the California Railroad Commission. Properties of the small northern California utility include a power plant on the south fork of the Eel River.

● PUGET SOUND POWER & LIGHT CO. has received a special award from the Seattle Chamber of Commerce for its service in publicizing the State of Washington and the Pacific Northwest through its 1944 advertising campaign.

● UNITED STATES STEEL Corp. has advised the government that it is interested in discussing a possible basis of purchase or lease of the government owned steel plant at Geneva, Utah for postwar operation. William A. Ross, president of Columbia Steel, U. S. Steel's Pacific Coast subsidiary, made the announcement to correct any false impression which might have grown out of recent discussion in the press of the possibilities of postwar production of steel west of the Rockies.

Sale of California Utility Properties Contemplated

Authority to sell its electric properties in Del Norte County, Calif., to California Oregon Power Co. for $175,000 has been asked of the State Railroad Commission by the Public Utilities California Corp. of San Francisco. Proceeds from the sale would be used as payment to Citizens Utilities Co., Minneapolis, Minn., on Public Utilities California's unsecured obligations.

Properties involved, including distribution systems and a diesel power plant, would be connected to Copco's system by a 50-mile line, it was stated in the application, and service could be extended to parts of Del Norte County not now served. The Del Norte properties are the only ones operated by Public Utilities California in the area.

Copco Lowers Electric Rates In Northern California

Electric rate reductions averaging 15 to 20% will be put into effect in northern California by California Oregon Power Co., following authorization by the railroad commission. The reductions were made possible by increased use of electric service, it was announced.

At the same time, lower rates were established by Copco in territory formerly served by the California Public Service Co. A recent commission decision authorizing acquisition by Copco of Public Service properties in the Alturas area provided that the lower Copco schedules be put into effect. Reductions in Alturas will average from 30 to 40%, it was reported.

● COMPROMISE SETTLEMENT in the Pepco litigation against Chase National Bank of New York was confirmed by Federal Judge James A. Fee at Portland on Feb. 23. The settlement is expected to bring benefits totaling in excess of three million dollars to the utility, its subsidiaries and stockholders. (EWEST February).

● A REDUCTION of city light and power rates was put into effect by the Forest Grove (Ore.) municipal system on Feb. 1.

AMERICA WANTS COMPETITION

Only American Initiative Can Preserve It in World Trade

AMERICANS generally agree upon what constitutes a desirable pattern of international economic relationships. We want an expanding world trade, with minimum recourse to government-imposed trade barriers and discriminatory trading arrangements, and offering ample scope for competitive private enterprise. Because they are necessary to such trade, we want also stability of exchange rates, and national currencies that are mutually convertible at least for the settlement of current accounts. We want, too, arrangements to facilitate long-term capital loans with security to the lender and advantage to the borrower.

Few other nations subscribe to these aims with enthusiastic conviction. Some reject them flatly as impractical under the conditions likely to prevail during the postwar period, or achievable only at prohibitive cost to their domestic economies.

Unless, therefore, we can formulate a practical and comprehensive program to carry out our aims, and convince other nations that we will take a sustained and responsible part in making it effective, the international trade of the world surely will be conducted under a system of exchange controls, bilateral agreements, cartel bargains, import quotas, and direct government purchasing arrangements that are the very antithesis of the competitive system that we favor.

To agree upon a concrete American **program,** and to convince other nations that it is to their advantage as well as ours to accept it, is a major task of economic statesmanship. It entails reversing a trend which has persisted since World War I, and which has been intensified during the depression years of the nineteen-thirties and by the exigencies of World War II.

Clearly, that is not a task to be assumed lightly. We can hope to be successful only if (1) we have a deep conviction that what we seek is fundamentally important to the American interest, and (2) if we will take pains to understand why other nations fear that such a program may jeopardize their interests, and then make whatever accommodations may be necessary to resolve their doubts.

An expansive foreign trade policy has been advocated so vigorously and repeatedly in America recently that The Economist (of London) comments wryly upon what it terms the ironic circumstance that "the acceptance of the principles of free trade by the more literate (American) public should come at a time when the doctrines in their simplest nineteenth-century form have been pretty generally emasculated in fact and repudiated in principle by the rest of the world".

☆ ☆ ☆

Why are we opposed to managed world trade, and for competitive world trade?

First, we are against rigged and managed international markets because we know that successful participation necessitates a comparable degree of control over the domestic economy as well. There is little debate of this fact, and those nations which accept a managed external trade as a necessary protective measure are generally willing to pay the price in internal regimentation. We are not. For us to do that would be as alien to our genius as it is repugnant to our conviction.

Second, we believe that the United States will be able to compete successfully in world markets, even though we have, and intend to maintain, wage scales far higher than those of the nations whose competition we must meet.

There is impressive evidence to substantiate the soundness of this conviction:

1. Wage scales, of themselves, do not determine the competitive position. They are meaningful only when translated into labor costs, by dividing wage rates by units produced. **A recent War Production Board study shows that in manufacturing industries generally, during the period immediately before the present war, production per man hour in the United States exceeded that in the United Kingdom, Germany and Soviet Russia by a ratio of more than 2½ to 1, and that of Japan by more than 4 to 1.** When comparison is made with available wage data, it appears that our labor costs are generally on a competitive plane.

2. Perhaps the best evidence of our ability to compete in export markets is the record of our demonstrated capacity to do so in the past. **During the entire period between World Wars I and II, the United States consistently commanded a greater share of the world's export trade than any other nation,** although the United Kingdom took a larger percentage of world imports.

3. We have been particularly successful in world trade competition in the export of machinery, vehicles, a variety of manufactured specialties, and certain agricultural products. Except in the last-named field, there is every evidence that we enjoy genuine competitive advantage over other nations, and this advantage will have been increased rather than diminished by developments during the Second World War. It is noteworthy that the goods in which we have been able to compete most successfully have generally been the products of our high wage industries rather than those in which low wages have prevailed.

☆ ☆ ☆

It is clear that, on a price basis, we shall be able to compete successfully in postwar markets in numerous lines. It is equally clear that such an opportunity is by no means of negligible importance to our own economy as a whole. During the years in which the censuses were taken between 1909 and 1939, our exports amounted

to from 7 to 16 per cent of our entire production of movable goods. **In the year 1938 our exports in each of the following lines accounted for more than 10 per cent of total domestic production of the particular product.**

(The figures in parenthesis are the percentages of total production exported.)

CRUDE MATERIALS: Phosphate rock (51.5), cotton (30.5), tobacco (29.4).

FOODSTUFFS AND BEVERAGES: Linseed (49.4), dried fruits (36.2), canned sardines (29.4), rice (21.0), fresh pears (15.9), canned salmon (13.8), canned asparagus (13.2), canned fruits (13.0), wheat (12.2), lard (11.7).

SEMI-MANUFACTURES AND FINISHED MANUFACTURES: Refined copper (53.1), paraffin wax (46.3), gum turpentine (42.6), carbon black (40.8), gum rosin (38.0), borax (35.9), crude sulphur (35.6), aircraft and parts (26.8), office appliances (22.3), carbons and electrodes (21.8), printing and bookbinding machinery (18.2), agricultural implements and machinery (17.0), biologic pharmaceuticals (15.3), industrial machinery (14.4), dental instruments and supplies (14.3), automobiles (14.1), benzol (13.3), goat and kid upper leather (12.8), refined lead (12.0), radio apparatus (11.8), caustic soda (11.4), refined mineral oils (10.6).

It is of major concern to all engaged in these lines of activity and in many others that foreign markets be not closed to us. It is particularly to our interest to have export outlets for our war-expanded capital goods and equipment industries. Since we undertook an important percentage of such expansion in order to furnish munitions to our Allies, it is reasonable to ask their cooperation in cushioning what inevitably must be a drastic readjustment here. The case is strengthened by the fact that the postwar world will desperately need the equipment items that we, alone, can supply.

But our demonstrated ability to compete on a price basis will not, of itself, assure us of foreign market outlets. Transportation costs, quality of product, marketing skill, technical and repair service—all are basically important. Still more important are non-discriminatory open markets and the command of dollar exchange by prospective purchasers. Our export potentials will surely be cramped in a world organized on the basis of bilateral deals and exchange controls. The availability of dollar exchange must depend upon the level of American imports and the volume of American capital loans.

☆ ☆ ☆

How are we to explain the skepticism of other nations toward an order which to us seems so clearly to represent not only our interest but the long-range interest of the world as well?

Soviet Russia, of course, is committed to conducting its external trade through its central government. But what of the United Kingdom? Why are there so many British voices that counsel the abandonment of what has been Britain's traditional position for more than a century? If we can understand that, we shall understand the dissent from our position of most nations whose economic positions have weakened and whose fiscal problems have multiplied during the two World Wars and the ill-starred period between them.

Essentially, their case is this:

Partly, they were forced into managed external trade policies by the Axis self-sufficiency programs, adopted in preparation for aggressive war. That can be corrected only by crushing the Axis, and by establishing a world security system that will make self-sufficiency a less compelling need.

But primarily, the reluctance of peaceably inclined nations to forego restrictive controls over postwar foreign trade stems from a deep-seated fear that is even more difficult to resolve. They fear, on the basis of past experience, that their efforts to meet payment balances arising from normal foreign trade would force a deflation of their internal economies, affecting prices, credit, wages, and finally employment. Faced with the choice, as they see it, between making adjustments in foreign trade or in their domestic economies, they lean toward the former as, at worst, the lesser of two evils.

☆ ☆ ☆

Since the kind of world trade system we seek is dependent upon international arrangements to assure reasonable stability of exchange rates between national currencies, we are challenged to find a formula that both will provide this and at the same time allay what other nations believe are legitimate fears with respect to their domestic economies.

But at least two major steps toward resolving such doubts can be taken upon our own initiative without recourse to the intricate process of international negotiation.

One is the rational overhauling of our tariff system, to provide other nations with increased opportunity to export to us. We can, and should, do this in a way that avoids undue cost to any segment of our economy.

The other, and probably the greatest contribution we can make toward winning a reluctant world to our point of view, will be to offer ample and convincing evidence that we are ready and able to provide a high level of employment in the United States. If we can do that, the rest of the world will wish to expose itself to our influence rather than to insulate against it, since prosperity here is the greatest single contributing factor to world-wide prosperity.

Balance of payment problems are minimized in a world of thriving trade. Britain would have little reason to resort to exchange controls if the total of postwar world imports and exports reaches an 80 billion dollar level. She may well be in a desperate plight if it should revert to the 1935 level of 40 billions.

☆ ☆ ☆

The United States wants a world in which private enterprise and competition play a major role. To obtain such a world will require a wiser, more understanding and firmer world leadership than this nation, or perhaps any nation, ever has exerted heretofore.

President, McGraw-Hill Publishing Co., Inc.

THIS IS THE 33RD OF A SERIES

PEOPLE
made this news

PG and E Announces Personnel Changes

Appointment of N. R. Sutherland as manager of the San Francisco division and of James F. Pollard as manager of the commercial department to succeed him, has been announced by Pacific Gas and Electric Co. through A. Emory Wishon, vice-president and general manager. The change is effective April 1.

Sutherland will succeed Henry Bostwick, who is retiring after 41 years with the company. Bostwick had been San Francisco division manager for 27 years.

Manager of the commercial department since 1923, Sutherland started with PG and E in 1913, immediately after being graduated from the San Francisco Evening High School. But even while going to school, he had had experience in the utility business as a lamp lighter for the old Welsbach Co. which serviced San Francisco's gas street lamps, making his rounds just before dusk and at four in the morning.

Pollard returned to San Francisco recently after 13 years in Seattle, where he was successively general manager and president of the gas company. Before going to Seattle, he had been for many years in the employ of PG and E and predecessor companies. He also had been general manager of Coast Counties Gas & Electric Co. at Salinas for several years and an engineer on the staff of the California Railroad Commission from 1915 to 1918. Since his return to San Francisco, he has been with PG and E, attached to the office of the vice-president and executive engineer.

Other recent personnel changes announced by the company are:

Appointment of T. W. Snell, manager of the Coast Valleys division at Salinas, as manager of the San Jose division to succeed I. B. Adams, who is retiring after 46 years of service with the company. T. E. Ward will be transferred to Salinas from Richmond to succeed Snell. Leigh H. Smith has been advanced from agent at San Leandro to manager at Richmond.

Transfer of Walter D. Skinner, farm power advisor of the sales department, Sacramento division, to the position of agent at Winters in the Sacramento division, succeeding C. E. Wyatt, retired.

John L. Morgan has been appointed district manager of the Petaluma district, North Bay division, to succeed L. J. Peterson, retired.

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Mica Insulator Company is the only insulation manufacturer today, with a complete line of all types of Fiberglas electrical insulation materials.

MICANITE-FIBERGLAS—Class B insulation according to AIEE classification. While the organic binder used may volatilize at elevated temperatures, the Fiberglas will keep the mica films in place and thereby largely retain the dielectric properties of the combination.

Micanite-Fiberglas is available in a variety of combinations and shaped to meet customers' specifications. Standard combinations are in six different grades designated as the F G series in sheets of varying thicknesses of 6 to 35 mils.

Special thicknesses and combinations of mica and Fiberglas can be manufactured to customers' specifications. Combinations using 1½- or 2-mil Fiberglas can be supplied in roll or sheet form.

EMPIRE-FIBERGLAS—Made in full width cloth and straight cut tape. Physical properties are high tensile strength, small stretch, flexibility, thermal conductivity. Average dielectric strength is between 700 to 800 volts for yellow, and 800 to 900 volts per mil for the black varnished Fiberglas.

Standard nominal thicknesses are 5 to 15 mils; special thicknesses can be furnished if ordered in sufficient quantities.

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Varnished Fiberglas tubing is available in two grades, Magneto and Radio.

Three grades of Saturated Sleeving are available, triple, double and single.

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Six Westerners Advanced in New General Electric Set-up

Six Westerners have been advanced by General Electric Co. in connection with the creation of its president's staff, which will coordinate company activities. Raymond M. Alvord, San Francisco, A. S. Moody, Portland, and A. L. Jones, Denver, all commercial vice-presidents, have been named to the president's staff; Allen G. Jones, J. R. Murphy and F. H. Doremus will take over their former duties at the three locations.

At San Francisco, Alvord's post as Pacific district manager of apparatus sales will be filled by Allen Jones, formerly Pacific district manager of the central station-transportation department.

J. R. Murphy has been transferred from Washington, D.C., where he was the company's special representative, to Portland to take over as Northwestern district manager of apparatus sales, the post formerly held by Moody. Murphy returns to the Pacific Coast, since he was for several years in the company's Seattle office and was manager at Spokane before going to Washington. He has been manager of the Rocky Mountain industrial division since 1938.

Doremus becomes manager of apparatus sales for the Rocky Mountain district, succeeding A. L. Jones.

The newly created president's staff will include ten commercial vice-presidents in all parts of the United States and will be under direction of E. O. Shreve of the New York office. The three Westerners will maintain headquarters in their present localities.

● Floyd D. Good has been made Northwest district representative for General Electric's construction materials division. Good will have headquarters in Portland and his territory will include the states of Oregon and Washington. He comes to G-E from the Kaiser Co., Vancouver, Wash., where he had been supervisor of electrical installation. Previously he had been associated with Stubbs Electric in Portland, the Eoff Electric in Salem and with Appleton Electric Co. as Northwest representative.

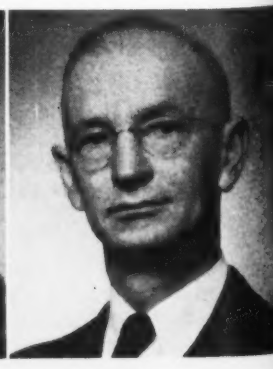
● L. D. Fowler has been appointed assistant sales manager of General Electric's integral-horsepower a-c motor section at the company's Oakland Works. With G-E since taking the test course in 1923, Fowler recently had been general office representative of the motor division at the Works.

● Edwin B. Hanson is now Pacific district transformer specialist for General Electric, with headquarters in San Francisco. His territory will include California, Nevada and Arizona.

Doremus

Murphy

Jones



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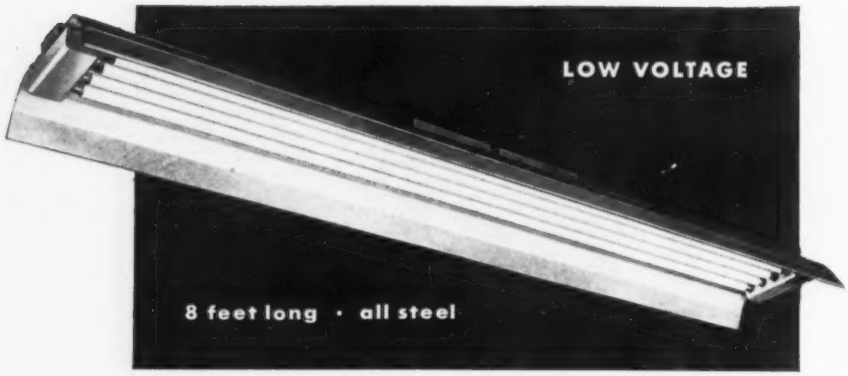
*COLOVOLT COLD CATHODE INDUSTRIAL FIXTURES



Here is the new Colovolt industrial fixture, one of a complete line of industrial and commercial "packaged" units. Equipped with the standard 93" Colovolt 10,000 hour lamp, Colovolt fixtures may be used singly or in continuous line lighting in multiples of 8 feet. Instantaneous starting, no flickering, guaranteed for 1 year except for failure due to breakage are extra advantages of the Colovolt Cold Cathode low voltage fluorescent lamp. The long life expectancy of Colovolt lamps may be realized even when constantly turned on and off, and *pre-scheduled re-lamping, with no loss of production or time, is now possible with Colovolt installations.*

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Specify scattered transformers to eliminate duplicate conduit runs and save on power costs.

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Washington Water Power Makes Personnel Shifts

Retirement of L. E. Morse, secretary, and W. H. Ude, manager of the claim, tax and right-of-way department, was announced last month by the Washington Water Power Co. At the same time, the company reported appointment of B. J. Lindsay as secretary and four personnel changes in the commercial department, affecting R. B. McElroy, A. H. Wegner, Carl Hoffman and E. E. Scofield.

Morse entered the employ of the company in 1907 and had been secretary since 1929. Lindsay, promoted from right-of-way agent, has been with the organization since 1930.

Ude started with the company in 1923 as superintendent of public relations. In 1932 he became director of public relations and in 1938 was promoted to the position he held at the time of his retirement.

In the new commercial set-up, McElroy will be manager of dealer sales development, which will be a separate activity under the "limited" company merchandise sales policy. He has been with the company since 1913 and has held various executive positions in the sales department since 1924.

Wegner, with the company since 1925, was advanced from Spokane division sales manager to general commercial manager. He will organize his staff to handle the general commercial activities with emphasis on coordinated planning and supervision of customer contact and promotional activities.

Replacing Wegner at Spokane is Hoffman, who started with the company in 1913 as an errand boy and was, at the time of his advancement, commercial sales supervisor at Spokane.

As wholesale and special contracts manager, Scofield will handle the contracts for wholesale, mining and other large customers. Joining the organization in 1922 as draftsman, he has been assistant industrial engineer, manager of industrial sales, assistant manager of the rate department and supervisor of power contracts and statistics.

● LADNER V. ROSS, manager of commercial and industrial sales, Washington Water Power Co., Spokane, chairman of the Spokane executive committee on readjustment and war contract termination, presided at a contract termination school conducted in the Inland Empire region recently.

● F. B. MARPLE has joined NuTone Chimes Inc. as Pacific Coast Sales manager. He has been sales manager of the Nicholson organization of Hollywood, distributors of major appliances.

Ayres Retires After Long Service At San Diego

On Feb. 1, 1945, K. B. Ayres, superintendent of electric transmission and distribution for the San Diego Gas & Electric Co., retired from service, thus bringing to completion 34 years of employment with the utility.

Ayres went to San Diego from the Cleveland Illuminating Co. in 1910 to install the first electrical distribution system and wire the buildings of the San Diego Theosophical Society. In 1911 he went to work for the San Diego Gas & Electric Co. and helped install San Diego's first underground electric system.

As superintendent of construction for the northern San Diego County district, Ayres did the preliminary survey work and construction of electric lines in Escondido, San Marcos, and Vista, as well as the tie-ins between these areas and Oceanside. Appointed distribution and transmission superintendent for the entire company area in 1918, he managed the building of a large part of the present electric system.

An active member of the PCEA for more than 25 years, Ayres was chairman of that organization's overhead system committee in 1924-25, chairman of the underground system committee in 1928-29, and chairman of the Operating Economics Section guidance committee in 1934-35.

Sandelin Allis-Chalmers Manager at Seattle

Appointment of U. E. Sandelin as manager of the Allis-Chalmers Washington district office at Seattle was announced recently by Frank Angle, manager of the company's district and branch offices. Sandelin succeeds A. J. Schmitz, now Pacific regional manager with headquarters in San Francisco.

As manager at Seattle, he will supervise the Spokane branch office. Born in Finland, Sandelin took his preliminary schooling at Marquette, Mich. and received a degree in electrical engineering from Tri-State College, Ind., in 1929. He took the Allis-Chalmers graduate training program and has been with the company since, coming to the coast from Washington, D. C.

● Norman Ferguson, of California Electrical Works, San Diego, has just returned from an interesting military assignment in the South Pacific, where refrigerated barges for food storage, built in San Diego and "knocked down" for delivery, were assembled under his direction in Australia.

Line losses on rural lines built of *Crapo* Steel Conductors are negligible compared with the overall savings made possible by these conductors.

For example: let's assume we are to build a single-phase, 6900-volt line 5 miles long with a normal load of one kilowatt per mile and 0.90 power factor. Assuming that the load is concentrated at far end of the line, the 5-kilowatt load will have a current of 0.81 amperes. The total resistance of this line built of No. 6 B.W.G. *Crapo* HTC-130 Stranded (3-wire) Steel Conductor will be 5 (miles) x 2 (conductors) x 11.29 (ohms per mile) or 112.9 ohms. The square of 0.81 amperes is 0.656 which, multiplied by 112.9 ohms, equals 74 watts.

For uniformly distributed loads the line loss is approximately two-thirds of that for concentrated loads. The I^2R loss for the line described above will be two-thirds of 74 watts or 49 watts. This means that the I^2R loss in delivering five kilowatts is only 1% of the input energy.

Actual operating experience of all REA Co-operatives for 1942 shows that the average load per mile of line was approximately one-third of a kilowatt. With a load of one-third kilowatt per mile, the I^2R loss on the 5-mile line will be only 5.4 watts. The total I^2R loss for a 24-hour day will be 0.13 kilowatts. Even at one cent a kilowatt-hour, this would mean but 0.13 of a cent per 24-hour day; approximately 47 cents per year for the 5 circuit miles, or 9.4 cents per mile per year.

Such a loss is insignificant compared with the savings of $100 to $150 per mile which have been reported where *Crapo* Steel Conductors have been used in long-span rural-line construction.

Your Post-War Plans

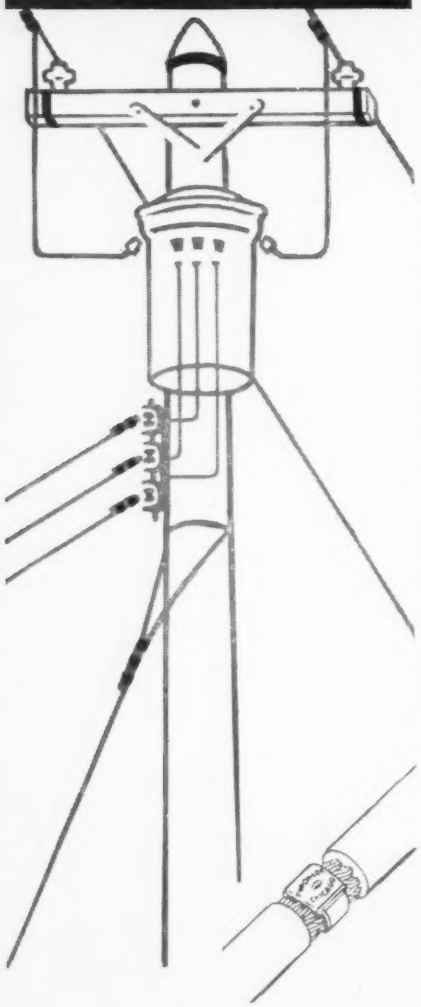
Consider the economical advantages of *Crapo* Steel Conductors in developing your post-war plans for extending rural lines! Complete technical information, including electrical and physical characteristics, sag and tension data, recommended construction practices, etc., will be found in our Engineering Manual, available upon request.

Crapo Steel Conductors are distributed by Graybar Electric Company, Inc. Ask the Graybar representative or write direct for your copy of the Manual.

INDIANA STEEL & WIRE COMPANY
MUNCIE, INDIANA

Crapo HTC-130 STEEL CONDUCTORS

PUNCH-LOK
Streamlined
Banding and Splicing Method



With Punch-Lok Clamps, applied with the Loking Tool, you can make connections easily, quickly, simply, safely . . . without taking down wires or installations. Will withstand any normal pull strain. Many other applications for repairing, banding, splicing, tying.

For descriptive catalog and name of nearest distributor, write Harry M. Thomas, Pacific Coast Representative, Dept. O, 1554 Oakland Avenue, Piedmont 11, California.

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321 N. Justine Street
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Munro Named to Sales Post With B. C. Electric

J. Calder Munro has succeeded the late E. E. Walker as light and power sales manager of the B. C. Electric Railway Co., Ltd., at Vancouver, according to an announcement by W. C. Mainwaring, vice-president in charge of sales. Munro has been assistant light and power sales engineer for the company for a number of years. He is a member of the Vancouver Electric Club and has taken a prominent part in industrial activities.

Concurrently with this announcement, Mainwaring told of the appointment of H. A. Elliott as director of power sales and that of R. Hall as director of lighting and residential services. Hall is also secretary manager of the Electrical Service League of British Columbia, having maintained that work in the past in addition to his duties as illumination engineer for the company.

A. Croker, branch manager for the company at North Vancouver, has been appointed director of all branch offices and J. Burchell has been appointed manager of the North Vancouver branch.

Walters Given New Duties at British Columbia

Howard N. Walters has been appointed director of industrial development by the B. C. Electric Railway Co. Walters has been with the company for a number of years and was manager of the Carrall St. store of the B. C. Electric at Vancouver, B. C. When the company opened its big Granville St. store in 1928, he was appointed manager there and continued in that capacity until shortly after the start of the war. During the past years Walters has been on loan from the company to the National War Finance Committee and was engaged as director of War Savings Certificates and stamp sales in British Columbia.

In his new office, Walters' duties will be to help industry find new products and to help new induseries get started in areas served by the company. He also will aid in the program of conversion from war to peacetime production of industrial plants in the company's territory. He will work directly under W. C. Mainwaring, vice-president in charge of general sales.

● E. E. Carpenter has retired from active service following 35 years with B. C. Electric Railway Co. He was consulting engineer at the time of his retirement and will continue to serve in an advisory capacity. Carpenter was in charge of engineering work on the Jordan River hydro-electric development in 1909 and has been responsible for planning and execution of all major power projects since 1923. Previous to that date, he spent several years in the United States on engineering assignments.

● Percy W. Lord, who has acted as agent for the B. C. Electric in the Ladner and Delta district for the past 10 years, and who also has operated his own electrical business, has severed connection with the power company. He is continuing his electrical appliance sales and service organization. The business is known as Lord's Electric.

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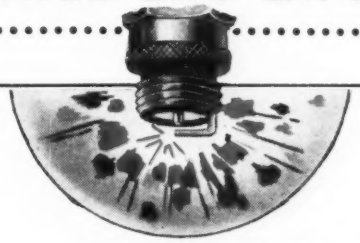
Severest Tests Show How Benjamin *Explosion-Proof* Fixtures *Insure against FIRES and EXPLOSIONS*

Shown here are some of the exacting laboratory tests which Benjamin Explosion-Proof Lighting Equipment must pass . . . and do pass with flying colors!

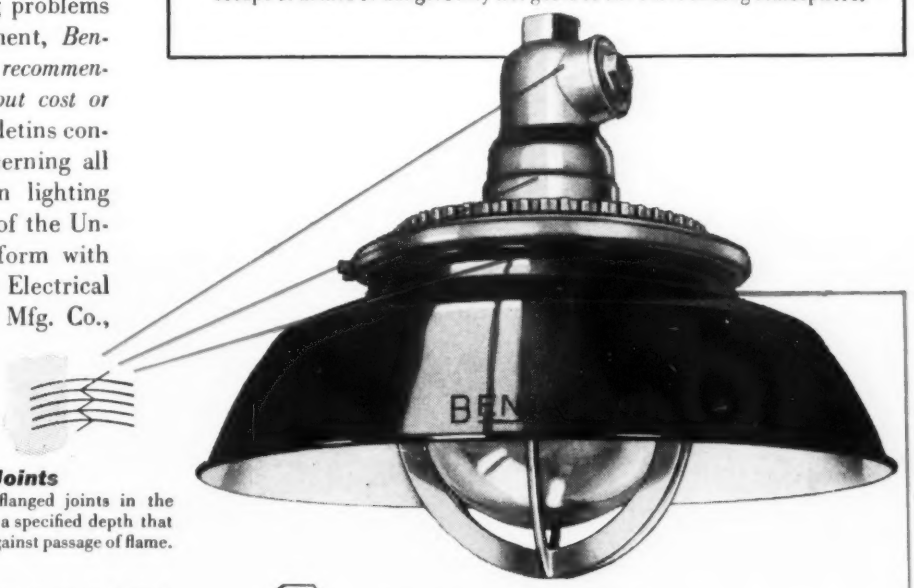
The dependability and safety of Benjamin Explosion-Proof equipment is to be found not only in the passing of these stringent laboratory tests but in the years of safe service it has rendered in thousands of installations throughout Industry.

In the solution of special lighting problems involving the use of this equipment, *Benjamin's experience and engineering recommendations are available to you without cost or obligation.* Write for Free Data Bulletins containing detailed information concerning all of Benjamin's hazardous location lighting units, all of which bear the label of the Underwriters' Laboratories and conform with all requirements of the National Electrical Code. Address Benjamin Electric Mfg. Co., Dept. J, Des Plaines, Illinois.



Thirty Severe Spark Plug Tests Demonstrate How Benjamin Explosion-Proof Fixtures Confine Explosions to Interior of Fixtures!

In this test, a spark plug is used to create ignition of explosive mixtures within the fixture. THIRTY EXPLOSIONS are thus created at 380 lbs. per sq. in. pressure! Benjamin units withstand these explosions. The fixture is neither destroyed nor damaged! There is no escape of flames or dangerously hot gases to the surrounding atmosphere.



Flame Proof Joints
All threaded and flanged joints in the fixture are made to a specified depth that positively insures against passage of flame.

Approved by Underwriters' Laboratories *for use in Class I, Group D hazardous locations. Under labeled re-examination service units are taken from the production line and periodically checked by the Underwriters' Laboratories to insure conformance to their rigid standards.*

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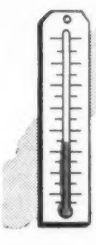
Oil Refineries, Lacquer Spray Painting, Natural Gas Plants, Dry Cleaning Plants, Artificial Leather Manufacturing, Paint and Varnish Works, Oil and Gas Wells, Pyroxylin Plastics, Moulding, Distilleries, Chemical Plants, Linoleum and Oilcloth Manufacturing. Pipe Line Pumping Stations, and other locations where highly flammable gases, mixtures or other highly flammable substances are used, handled, or stored in other than their original containers.



Temperature Controlled

Every Benjamin Explosion-Proof fixture operates at a carefully controlled temperature that precludes any possibility of the fixture heat causing an explosion in the explosive atmosphere in which it is installed.

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Lighting Equipment

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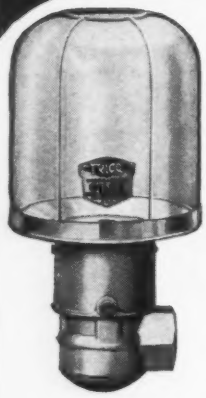
TRICO OILERS



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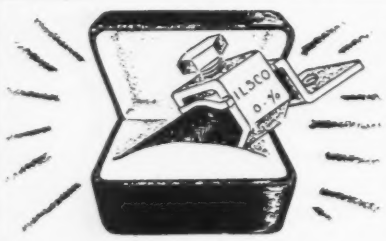

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Why pay more for the box than the contents? Or, why pay for the extra weight of cast lugs or poor conductivity when you can buy ILSCO PRODUCTS of lighter weight, 99.99% PURE ELECTROLYTIC COPPER AND 100% CONDUCTIVITY! More efficient . . . more economical . . . Underwriters approved.

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R. Thomas & Sons Co.
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Electroline
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Roy Dreiman Advanced By Coast Counties

Coast Counties Gas & Electric Co. last month announced the appointment of Roy N. Dreiman, general auditor and assistant treasurer, as vice-president and comptroller, with headquarters in San Francisco. He will continue as a director. Dreiman moved to California in 1928 to become secretary-treasurer of the companies managed by the Standard Management & Operating Corp., and in 1932 went with Coast Counties at Santa Cruz. In his new position, he will be comptroller also for Pacific Public Service Co. and Arrowhead and Puritas Waters Inc.

The company also announced election to the board of directors of A. E. Strong, Charles Grunksy and Lt. Col. A. R. Bailey, now serving in France.

J. K. Horton was elected secretary and assistant treasurer to succeed B. W. Letcher, who resigned. H. D. Armstrong becomes treasurer succeeding H. C. Judd, resigned, and John E. Wolfe was named assistant secretary.

Central Arizona Makes Organization Changes

Changes in the organization and responsibilities of executives of the Central Arizona Light and Power Co., effective March 1, were announced by Edward H. Coe, president of the company. Coe will continue as president, but no longer will carry the burdens of general manager. The new appointments are:

Louis K. Doutrick, vice-president and general manager; A. F. Morairty, vice-president with responsibilities of public relations work, postwar planning and industrial development; George H. Groh, general superintendent and chief engineer in charge of all operations, construction and maintenance, and Milton G. Sanders, general sales manager.

C. A. Hulse is secretary and treasurer, and Frank E. Mell is assistant secretary and treasurer.

● DONALD R. JENKINS, steam engineer for Westinghouse Electric & Mfg. Co. at Los Angeles, is instructor for a University of California war training course in steam turbine applications for industrial and central station power plants. The classes began Feb. 5 and will continue once a week for 16 weeks.

● MAJOR E. G. STAHL, formerly sales manager of the San Joaquin Power division of Pacific Gas and Electric Co., has been promoted to lieutenant colonel. He is in the European theater of operations.

Answer to "Who Am I?"

W. G. Willson

(See Page 90)

Electriquiz Answers

1. A two-million-volt industrial machine, making possible radiographic examination of castings and metal structures. Recently perfected, it can inspect steel sections up to 12 in. in thickness in less than an hour, compared to a week with a million-volt tube.

2. In 1914 he had 3.20, of which .56 was in motors driven by purchased energy. Today he has 6.50, of which 3.80 is motor power run on purchased energy. It has been stated that mechanization of the United States has made available six billion manpower, equivalent to 50 slaves for each man, woman and child.

3. In 1900 artificial light cost 25 to 30 times more than it does now. A century ago it cost a hundred times more. A penny now buys as much light as a dollar did a century ago.

4. Dr. Robert James, Detroit, in 1934. It was perfected and placed on the market in 1937.

● Three Pacific Coast Engineers have been nominated for national offices in the American Institute of Electrical Engineers for the 1945 administrative year. L. M. Robertson, transmission and station engineer of the Public Service Co. of Colorado, has been named for the vice-presidency representing the North Central District. F. F. Evenson, San Diego consulting engineer, has been nominated vice-president representing the Pacific District. Walter C. Smith, Pacific district engineer, General Electric Co., has been nominated as a director.

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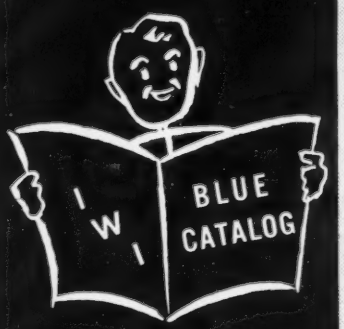

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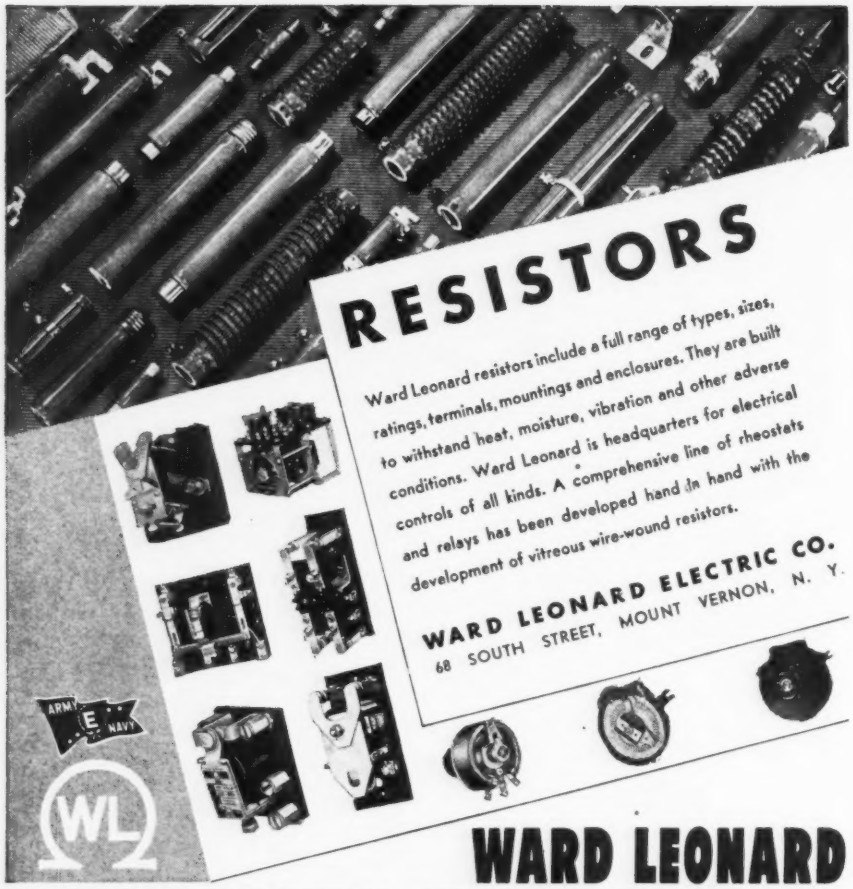
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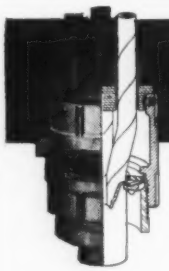

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2500 VOLT TERMINATING POTHEADS

For Indoor Use

Designed for indoor use on conduits or exposed cables, this O. Z. terminating pothead is one of a complete line for all types of cables up to 2500 volts. The O. Z. line also includes 750 volt potheads for both vertical and horizontal use along with a complete selection of Sealing and Compound Bushings.

Write for your copy of the 144 page O.Z. Catalog. At a glance, you'll find the answer to your needs in Conduit Fittings ... Cable Terminators ... Junction Boxes ... Solderless Connectors ... Power Connectors ... Grounding Devices.

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Westinghouse Supply Makes Changes in Northwest

Westinghouse Supply Co. has announced appointment of two new managers in the North Pacific district. Earl W. McBratney has been named district sales promotion manager and Arthur F. Sheean, district lamp manager. Both men will be headquartered at Seattle.

McBratney was born and educated in Washington. Following graduation from the state university, he went to work for Puget Sound Power & Light Co., leaving in 1941 to join Westinghouse Supply.

Sheean started with the company in 1928 as an order assemblyman and later worked in the service department as appliance repairman. In 1939 he was made manager of advertising and sales promotion and a year later became apparatus and supply salesman.

Appointments in Southern California Announced

Louis G. Berger has been named assistant district manager and Wilbert W. Bell, district apparatus and supply manager for southern California by Westinghouse Supply Co. Headquarters are in Los Angeles.

Berger worked first for Illinois Electric Co. in Los Angeles, joining Westinghouse in 1927, when the Illinois company was dissolved. Bell is a native of San Francisco, was with the Canadian Westinghouse Co. for five years before joining the supply company as a salesman.

● SYLVANIA Electric Products, Inc., has appointed Cortland T. Clark as northwestern manager of its radio tube division, with headquarters at Seattle. Clark recently was honorably discharged from the Navy. He was at one time connected with the Industrial Electric Co. and later was appliance sales manager for the North Coast Electric Co. at Seattle. In his new post, his territory will include the states of Washington, Oregon, Montana and northern Idaho.

● HAROLD R. LEE recently was named power manager for the U. S. Bureau of Reclamation in Denver, Colo., where he will supervise power project operations and marketing of electrical energy for the region, it was announced by E. B. Debler, regional director. Formerly chief of the power marketing and sales division of the bureau and at one time Denver regional utility engineer for the War Production Board, Lee also will plan power phases of future reclamation projects in the area.

Three Westerners Among High School Winners

Three high school students from the far West were among the finalists in Westinghouse Electric & Mfg. Co.'s fourth annual Science Talent Search. The three are Halsey Lawrence Royden, Jr., Phoenix, Arizona; Margaret Joan Hodgson, Belmont, Calif.; Robert Norman Diebel, Eugene, Oregon.

Finalists went to Washington in March, with all expenses paid, to attend the five-day Science Talent Institute and compete for $11,000 in Westinghouse scholarships.

● THREE ENGINEERING CONSULTANTS have been added to the staff of Ivan Bloch, chief of the Bonneville industrial and resources development division and will assist in planning a load-building program promoting postwar use of Columbia River power. They are O. C. Falkovitch, formerly with the Tennessee Valley Authority, who will specialize in home heating and agricultural and urban uses of electricity; G. V. Palmrose, chemical engineer recently associated with Weyerhaeuser Timber Co. and Dow Chemical, who will specialize in the field of chemistry; and W. W. Schultz, formerly with Lithaloys Corp., New York, and the Office of Price Administration, who will specialize in development of the metallurgical industries.

● H. M. RUTLEDGE, formerly in the San Francisco division of National Carbon Co., is now located in Seattle for that company.

Deaths

Edmund Ernest Walker, light and power sales manager, B. C. Electric Railway Co., died suddenly at his home at Vancouver, B. C., recently. Mr. Walker had been head of the light and power department since his arrival from England in 1914 and his ability as a song leader and genial personality made his appointment as master of ceremonies inevitable at almost every function in connection with the electrical industry in Vancouver. Formerly, he had been connected with a large light and power concern in Surrey, England.

Mr. Walker was past president of the Vancouver Electrical Club. He had been chairman of the Electrical Service League since its inception in 1920 and was also a member of the Professional Engineers' Society.

He was responsible for the standardization of the B. C. Electric light and power rates.

● For Complete New Wiring Systems
● For Extension Wiring
● For Reconversion Wiring
● For Maintenance Wiring

TYPE SN
FOR GENERAL PURPOSE WIRING

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FOR WIRING IN WET LOCATIONS

You'll find Flamenol* Building Wire easy to use. It can be stripped and connected quickly. Its small diameter enables more conductors to be used in conduits or ducts. The hard smooth finish of its thermo-plastic insulation aids wire pulling. Moreover, Flamenol Building Wire can be installed in any location. Type SN is ideal for general purpose wiring wherever Type R is permitted. Type SNW is ideal for wiring in wet locations.

The insulation of this wire is practically ageless, has high dielectric and mechanical strength, is flame retarding and is resistant to oils, acids and alkalies. In addition, Type SNW Flamenol wire insulation has low moisture absorption. Both types of Flamenol Building Wire are available in sizes 14 to 2,000,000 CM.

Hear the General Electric radio programs: "The G-E All Girl Orchestra," Sunday 10 P.M. EWT, NBC. "The World Today" news, Monday through Friday 6:45 P.M. EWT, CBS.

BUY WAR BONDS AND KEEP THEM

FOR FURTHER INFORMATION see the nearest G-E Merchandise Distributor or write to Section W351-18, Appliance and Merchandise Department, General Electric Co., Bridgeport, Conn.

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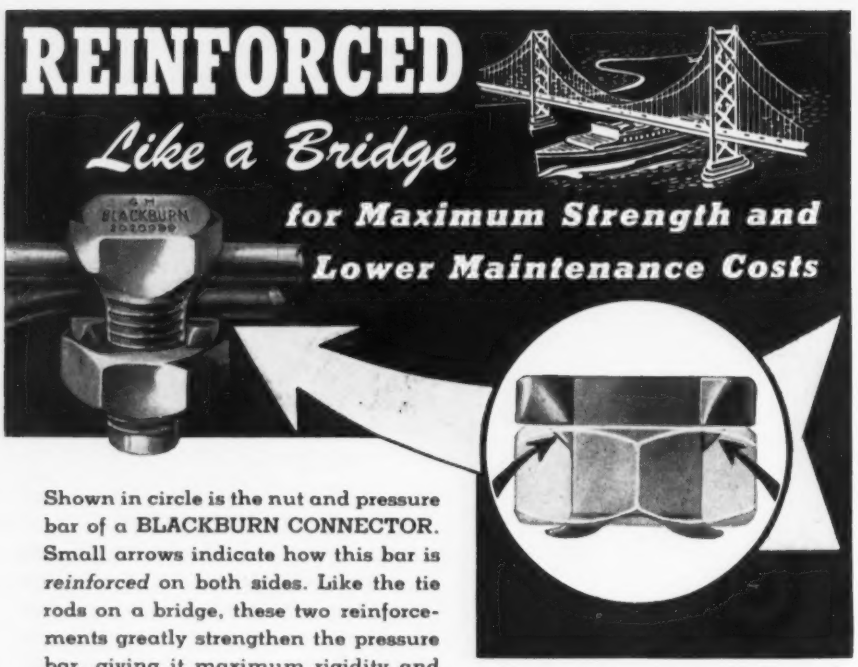
REINFORCED
Like a Bridge
for Maximum Strength and Lower Maintenance Costs



Shown in circle is the nut and pressure bar of a BLACKBURN CONNECTOR. Small arrows indicate how this bar is *reinforced* on both sides. Like the tie rods on a bridge, these two reinforcements greatly strengthen the pressure bar, giving it maximum rigidity and enabling it to distribute the pressure over the entire length of the connection. Thus, the BLACKBURN reinforcing makes a strong connector still stronger!

Over 100 Conveniently-located Jobbers' Stocks

BLACKBURN *Hy-Strength* **CONNECTORS**

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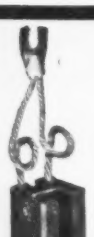

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Give Better
Commutation,
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RELIANCE TIME SWITCHES

10 to 50 Amp.

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Single Pole
Double Pole
Two Circuit
Indoor and
Outdoor Types

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A complete line of automatic time switches for practically every installation. Highest quality construction with a record of dependable service for nearly 35 years. Specify Reliance Time Switches and be sure you are specifying the best. Catalog on request.

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RELIANCE AUTOMATIC LIGHTING CO.
1929 Mead Street Racine, Wisconsin

● CLARK W. MILLER, 63, safety director of The Washington Water Power Co., Spokane, died suddenly Jan. 29 while enroute from Boise to Spokane. Mr. Miller had attended a meeting of safety engineers in Boise, Idaho, the previous day and appeared to be in good health up to the time of his death, which was not discovered until the train porter attempted to awaken him shortly before the train arrived at Spokane on his return home.

Born in Osage, Iowa, he went to Spokane to work as a groundman in the city line department in March 1907, having previously been employed by Northwestern Bell in Minneapolis. He was promoted from groundman to foreman in 1914 and advanced to city line foreman in 1935. His interest in safety led to his appointment as assistant safety engineer in 1938 and he became head of the department in January 1942.

● CLEMENT A. K. CORNWALL, 69, prominent B.C. electrical engineer, died at Victoria, B.C. recently. Mr. Cornwall was graduated from McGill University as an electrical engineer and joined the West Kootenay Light & Power Co. at Nelson, B.C. Later he spent some years with the B.C. Electric Railway Co. at Vancouver and in 1908 returned to Victoria. From that time until his death he was assistant superintendent of the City Electrical and Mechanical operating departments.

● WILLIAM CRAIG JARVIS, one of the first electricians in the City of Vancouver, B. C., died recently at his home there at the age of 74. Mr. Jarvis was born at Red Rock, New Brunswick, and came to British Columbia in 1888 when he was 17 years of age. He was employed for a time by the Nanaimo Electric Light Works in Nanaimo, B. C., and went to Vancouver in 1907. He was associated with the Jarvis Electric Co., from which he retired five years ago.

● THE DEATH of Lee A. Barley brought to an end the career of "the dean of Colorado electrical men" at his home in Denver Feb. 6. He had been chief electrical engineer for the Mountain States Inspection Bureau 35 years, until his recent retirement. A charter member of the Western Electrical Assn. and a member of the board of fire underwriters, he was 72 years old.

● COLIN A. ROSS, former Pacific Gas & Electric Co. executive, died Feb. 15 at his home near Napa, Calif., following a long illness. He was 65. Mr. Ross had retired from the utility company service five years ago.

TRADE notes

Meier Forms Own Company in San Francisco Mart

Charles A. Meier, for 31 years a member of the Westinghouse Electric Appliance division, has formed his own organization, the M. and M. Sales Co., and will represent electric appliance and commercial and industrial supplies manufacturers.

At present, Meier represents four manufacturers in a territory comprising southern Idaho, Utah, Nevada and Arizona. He is handling the Akron line of commercial cooking equipment, heavy-duty ranges, grills, hot plates and roasting ovens for shipboard and commercial use; representing the E. J. McAleer Mfg. Co., of Philadelphia, in a line of government specification metal tool boxes; the So-Lo Works, Inc., Loveland, Ohio, makers of mending materials, and the Keldur Corp., New York, manufacturers of material for isolating vibration.

When electric appliances are available again, the M. and M. Sales Co. will be representatives for electric ranges and electric water heaters manufactured by Associated Products, Inc., of Akron, Ohio; metal kitchen cabinets manufactured by the E. J. McAleer Mfg. Co., Philadelphia, and nationally known lines of radio receivers and socket appliances, Meier announced.

Marsden Will Head New G-E Distribution Office

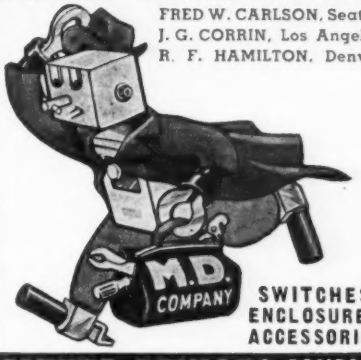
Archie Marsden will be manager of the new General Electric office to be opened in San Diego for distribution of G-E appliances throughout San Diego and Imperial counties. Marsden is well known to electrical dealers in the area since, prior to the war, he was sales manager for the George Belsey Co. of Los Angeles, G-E distributors in the two counties.

Establishment of the San Diego office means that distribution of G-E refrigerators, washing machines and other household lines will be on a factory-direct basis in both areas postwar.

● A NEW BRANCH house of General Electric Supply Corp. has been announced by Harry C. Gerster, Northwest District manager, Seattle, to open in Tacoma as soon as facilities are available for warehouse and shipping. Joseph R. Tilley, who has represented G-E Supply in the Tacoma territory, will become branch manager. The new branch will serve most of southwestern Washington, Tacoma and vicinity. The Northwest District now has four centers of distribution, Seattle, Spokane, Portland and Tacoma.

● FARR ELECTRIC CO., Ogden, recently moved to larger quarters to provide room for the increased business it has done and to furnish space for expansion to appliance selling and servicing when merchandise is again available. A. P. Farr is the owner.

WESTERN REPRESENTATIVES
FRED W. CARLSON, Seattle
J. G. CORRIN, Los Angeles
R. F. HAMILTON, Denver



SWITCHES, ENCLOSURES, ACCESSORIES
METER DEVICES COMPANY CANTON, O.

If you want to MAKE IT SAFE

wire it with FIREWALL

Rockbestos Firewall Aircraft Wire is this company's latest contribution to the war effort. This wire, together with every other wire, cord and cable in the entire Rockbestos line is permanently protected by a dense, uniform felted asbestos wall that has been thoroughly impregnated with a special compound to insure absolute flame and heat-resistance. Heat that destroys ordinary insulation . . . dries it out . . . causes cracks, flaking, and eventual failure and replacement . . . never fazes Rockbestos.
Whether you want to wire or rewire . . . under normal or severe operating conditions . . . let us help you make the right Rockbestos selection. Remember, Rockbestos Wire . . . Cord . . . Cable . . . *are permanently insulated.*

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911

Puget Sound Organization Tells Expansion Plans

Charles Hess, who resigned recently as utilization manager for Puget Sound Power & Light Co., has joined with R. F. McInnes in the Puget Sound Appliance Sales Co. of Seattle and Spokane.

The expanded company will wholesale electric home equipment and maintain a repair and service department. It will cover a territory including most of Washington, the northern half of Idaho and Alaska. A franchise has been secured from Electromaster and franchises for refrigeration and laundry equipment are being arranged. The company also will handle a line of steel kitchen cabinets.

Formed in 1935 to retail Whitehead monel sinks, work surfaces and cabinets, the company later established a kitchen planning service and before Pearl Harbor was handling a full line of home electrical equipment. In 1941 it had a large sales floor in downtown Seattle and another in west Seattle, a warehouse and electric service and repair shop, a sales force of 17 and service force of six.

When McInnes enlisted in the Navy right after Pearl Harbor, the business was continued as a service organization only. Upon his medical discharge, it was decided that the company would change from the retail to the jobbing field.

McInnes, who was with Puget Sound Power & Light for ten years before leaving to manage the appliance sales company, is president of the organization, and will have active charge of the Seattle office. Hess is executive vice-president and in charge of the Spokane operations. W. G. Portley is vice-president. Paul S. Ford is secretary-treasurer. The latter two also are former employees of the power company.

Hess

Columbia Electric Under New Management Set-up

Eric A. Johnston, president of the Columbia Electric Co. and president of the United States Chamber of Commerce, has announced that he is releasing active management of the Columbia Electric to Walter Toly and Clarence A. Tubbs.

At the recent annual meeting of the company, Toly was elected vice-president and general manager of the manufacturing division, and Tubbs vice-president and general manager of the distribution division. Mrs. Ida B. Johnston was re-elected secretary and treasurer.

Columbia Electric, which has had heavy war contracts, has grown since its start in the wholesale business in 1935 to the largest independent electrical distributor in the Spokane area. Tubbs, who has been identified with the development and growth of the company for the past seven years, said that the firm is looking for a tremendous postwar business and has its house in order to handle it.

Paul White will be office manager and treasurer under Tubbs; Ken Featherman, manager of radio parts; and Elmer Johnston, manager of the electrical supply department.

● Resin Industries of Santa Barbara, Calif., producers of thermoplastic synthetic resin insulating materials, has announced the opening of a branch office in Los Angeles. The new office is under the management of Perry Goodspeed and is located at 3902 W. Sixth St.

● Clarence F. Jensky has been named head of the newly created turbine sales division of the Joshua Hendy Iron Works, Sunnyvale, Calif.

McInnes

Kaiser to Head Group of Engineering Consultants

More than 200 engineers associated with Henry J. Kaiser in the construction of hydroelectric and other engineering projects recently organized as a permanent group under the name of Kaiser Engineers. Headquarters are in Oakland, Calif.

The company includes engineers in most of the major fields of engineering—electrical, hydraulic, civil, structural, mechanical, architectural and metallurgical. A staff also will be available for the procurement of materials and equipment.

Kaiser is president of the organization, with E. E. Trefethen, Jr., vice-president; T. M. Price, vice-president; George B. Havas, vice-president and general manager; George B. Scheer, chief consulting electrical engineer, and George W. Vreeland, chief consulting engineer.

In announcing formation of the organization, Kaiser stated that the group will act in a consulting capacity in making surveys, estimating costs and preparing designs, or that it will, upon request, engage in actual construction. He said the company will be prepared to undertake engineering work in any part of the world.

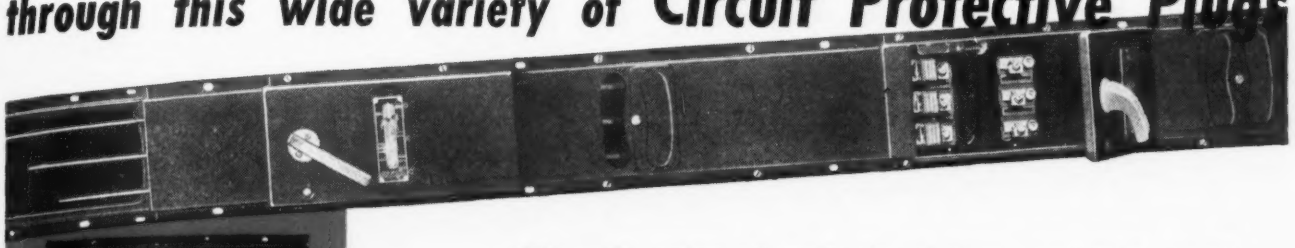
● That the Graybar Electric Co., 106 West Market Street, San Diego, California, will be distributor for the new Bendix Radio scheduled to appear on the postwar market was announced recently by R. T. Redfield, San Diego Graybar manager. Other postwar lines to be handled by the San Diego Graybar company are the Gibson refrigerator, Royal vacuum cleaners, and a complete line of small table appliances including such well known names as Toastmaster, Manning Bowman, Sunbeam, Proctor, Telechron, Silex, and Nu-Tone Chimes. Supplying the Army and Navy with vitally needed electrical and radio equipment keeps the San Diego Graybar Co. busy at the present time.

● A Colored Sound slide film portraying the history of the American Merchant Marine has been prepared by Westinghouse and is available for showing to any group interested. Entitled *This Time . . . Let's Keep Our Merchant Marine*, the film requires one-half hour for showing.

● Hubbard & Co.'s Emeryville, Calif., plant was granted the fourth renewal of its Army-Navy E Award recently. The Emeryville plant received the first award for excellence in production on Dec. 24, 1942, and has held the E continuously since.

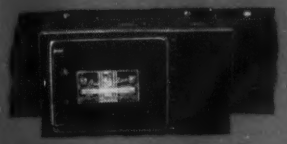
With BULLDOG BUStribution DUCT

you can get increased capacity, flexibility, completeness, through this wide variety of Circuit Protective Plugs



VACU-BREAK SWITCH PLUG

Fusible and non-fusible, 30 to 600 amp., 2 or 3 pole, 575 volts or less, or 4 pole solid neutral 230 volts A.C. H.P. rated.



TYPE "PB" BUS PLUG

Cover operating types, in 30, 60 or 100 amp. Horsepower rated. Fusible and non-fusible, 575 volts or less.

CIRCUIT BREAKER PLUG

For use where an automatic protective device is required, with either rigid or flexible conduit — max. capacity, 600 amp., 600 volts.

CIRCUIT MASTER PLUG

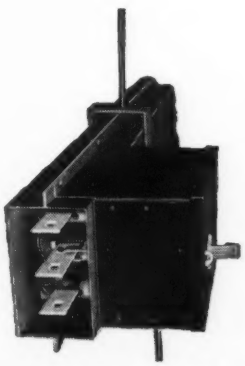
Designed for single pole circuits for 120 volts and 2 pole for 208 volts, 15 to 50 amp.

The wide variety of pre-fabricated circuit protective tap-off plugs available for use with BUStribution DUCT is just another example of the thoroughness of BullDog engineering.

Built for every circuit protective purpose, BullDog Standard Bus Plugs give you both increased capacity and complete flexibility for rearrangement of production machinery. Additional outlets can be installed quickly and inexpensively—change-overs can be made in minimum time, with minimum labor cost and no material loss.

All Bus Plugs fasten securely to the flanges of the duct section at the plug-in openings, may be mounted on either or both sides of the duct and require no auxiliary screw clamps or fittings. Engagement with the bus bars is made through spring reinforced contact fingers so designed that accidental contact with live parts is impossible.

For complete information on the various BullDog Bus Plugs illustrated in this advertisement, write for our illustrated bulletin 427-2.



PLUG MOUNTED ON DUCT

This end view of a plug mounted on duct shows how the copper "contact" fingers of the plug clamp over the bus bars in the duct.

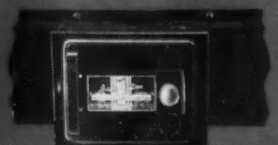
Manufacturers of a complete line of Vacu-Break Safety Switches, Panelboards, Switchboards, Circuit Master Breakers and BUStribution SYSTEMS.

BULLDOG
ELECTRIC PRODUCTS CO.

BOX 177, R. PK. ANNEX
DETROIT 32, MICHIGAN

BullDog Electric Products of Canada, Ltd., Toronto, Ont.

Field Engineering Offices in All Principal Cities

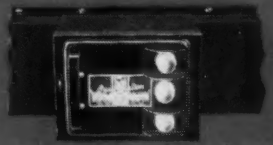


TEMPERATURE INDICATING PLUG

When temperature of bus bar exceeds 100° C. (212° F.) (30° C. ambient plus 70° C. rise), lamp automatically lights.

CAPACITOR PLUG

Convenient and flexible means for improving Power Factor. Available from 1 to 15 K.V.A., 220 or 440 volts, 60 cycle A.C.



GROUND DETECTOR PLUG

7½ watt externally mounted Mazda lamps provide visual indication for [illegible] grounds or faults.

BULLDOG PRODUCTS ARE SOLD AND DISTRIBUTED BY THE FOLLOWING PACIFIC COAST REPRESENTATIVES:

Coast Electric & Manufacturing Co.
1720 N.E. Sixth Avenue
Portland, Oregon, Tel. Garfield 2844

Safety Switchboard & Manufacturing Co.
1445 Stevenson St.
San Francisco, Calif., Tel. Hemlock 2470

Mullenbach Electrical Manufacturing Co.
2300 East 27th Street
Los Angeles, Calif., Tel. Jefferson 2224

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PROFILES *of the month*

Below: Talking over the future of the Washington Committee on Relation of Electricity to Agriculture are five committeemen who attended recent annual committee meeting in Seattle. From left, they are: W. H. Ude, Washington Water Power Co., committee treasurer; Dean Edward C. Johnson, Washington State College; George T. Bragg, Pacific Power & Light Co.; John C. Scott, Puget Sound Power & Light; Professor L. J. Smith, Washington State College, secretary of the committee

Kenneth A. Connolly, president, F. B. Connolly Co. of Seattle and Portland, and J. M. Tenney at S. F. Mart

Guests at the San Francisco premier of the G-E movie on frozen foods (see p. 82) were invited to sample the results. Below, B. M. Tassie, G-E Pacific district appliance sales manager, serves Jane Maggard and Esther Hall of the Chronicle, while Elizabeth Madigan, G-E Consumers Institute, looks on

Partners

a word that means much to P.G. and E.

121,075 Stockholders

85.3% own only 1 to 100 shares each

This Company, serving gas and electricity to more than 1,750,000 customers in 46 of California's 58 counties, is largely owned by average "home folks" of modest incomes. There are 121,075 holders of P. G. and E. stock and of these, 103,000 or 85.3 per cent hold from 1 to 100 shares apiece.

The partner-ownership of P. G. and E. stock is typically Californian. It springs from the desire of small investors to place their savings in a California institution which with its predecessors, has been in business in this state for more than 90 years. It is an expression of their faith in the continued growth of the state and in an industry that aids and adds to prosperity.

29,000 or 24.1 per cent of these small "savings account" holdings are from 1 share to 10 shares for each holder and 74,106 or 61.2 per cent are from 11 to 100 shares each. Only 640 stockholders own 1,000 shares or more.

Widespread ownership of our stock by "home folks" means much to this Company. It means a common interest between the Company and those we serve. It is YOUR Company, giving you gas and electric service at rates far below the national average.

P·G·and E·

PACIFIC GAS AND ELECTRIC COMPANY

E.W. 13X—345

ELECTRIC WIRING CAN BE *overloaded* TOO

There is a limit to the electric "load" a home wiring system can carry. In many homes, including thousands built for wartime housing, the use of electrical appliances and services is limited by inadequate wiring. When new appliances again are available, these homes must be re-wired to provide sufficient outlets, switches and wire . . . to bring them up-to-date electrically.

This represents a postwar opportunity for the industry. And by taking full advantage of it, the market for new appliances can be increased tremendously. The entire industry has an obligation, as well as an opportunity, to make plans *now* to help home owners re-wire their homes adequately as soon as wartime restrictions are lifted.

PACIFIC COAST ELECTRICAL ASSOCIATION

601 W. FIFTH ST., LOS ANGELES 13, CALIFORNIA • 447 SUTTER ST., SAN FRANCISCO 8, CALIFORNIA